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Original Contributions.

ON THE ETIOLOGY OF DENTAL CARIES.

BY GEO. W. COOK, D.D.S., CHICAGO.

In recent years there has been an apparent tendency to question Miller's work on the cause of dental caries. I think that no one realized more than did Miller the importance of further elucidating the problems of caries of the teeth. During the last few years Dr. Miller had tried to explain his reason for thinking that dental caries was due to certain bacterial action. Miller himself fully realized that he had gone over a large field of bacteriologic study without having worked out all of the possible details whereby his work might be attacked. In fact, there is no scientific investigation that has not been called into question from some standpoint or other. I need only to quote from Miller himself to show that he did not claim to have settled the question of dental caries or that his hypothesis of the cause of dental caries could not be assailed.

Kenneth W. Goadby, in the June (1899) number of the Transactions of the Odontological Society of Great Britain, assailed some of Miller's work on the grounds that it was imperfectly done and because it lacked throughout in method. Miller in replying said: "This criticism seems not quite just to me and is, perhaps, uncalled-for in view of the fact that I have never undertaken to make a thorough study of the microorganisms of dental caries. My first cultures were made by the old fractional method and the succeeding ones were made on gelatin, as agar-agar was not in use at that time. I did not incorporate these experiments in my book on "The Microorganisms of the Human Mouth" for the reason there stated —that I did not consider them sufficiently extensive or conclusive.

"Besides this the work I did from 1880 to 1890 covered such an immense field that it was quite impossible for me to attempt to make a thorough study of all of the scores of different kinds of

bacteria that came under my notice. I have repeatedly criticised my own mistakes in trying to do too much. However, it was not, at that time, so much a question of classifying and thoroughly studying the different kinds of bacteria met with, but a question of a more general nature that demanded attention. In my book and various communications in the dental journals, I laid down the foundation for as much work as all the bacteriologists in the ranks of the dental profession may be able to accomplish in many years to come."

It will be seen from the above quotation that Miller himself never claimed that he had completely solved the problem. In the October number of the DENTAL DIGEST, on the first page, is found an article by Dr. Hugh H. Wightman on the "Etiology of Dental Caries," in which he has attempted to demonstrate that dental caries is due to certain decomposition processes of the mucin of the saliva and the mucous secretion of the oral mucous membrane. In this article the process of reasoning is one that cannot fail to attract the attention of anyone who wishes to study the subject in anything like a detailed manner. Beyond question this is an admirable and scientific paper.

From the experimental work done upon this very important phase of the question under consideration, I am unable to establish in my mind the correctness therein, and it would be quite out of place for me in this article, and, besides, I have not the time, to analyze this subject as I should like to with the experiments that I have gone over so many times to test the correctness of what, a few years ago, I believed to be the cause of tooth decay.

I do not believe that we are prepared at this time, with all the known facts at our disposal, to say that caries of teeth can be explained by the so-called mucin theory. Dr. Buckley, in an editorial in the DENTAL DIGEST in the issue above quoted, also calls attention to what he says is a new theory advanced by Dr. Wightman. I think if Dr. Buckley will review the literature on dental caries he will be able to find that the mucin or mucus theory of dental caries is not so new as it at first would seem.

I am willing to admit, and I have demonstrated to my own satisfaction, that there are certain acid derivatives in the oral mucous fluids, and that under some circumstances this acid acts upon tooth

substance; but not in the form of attacking the enamel and destroying the surface of that tissue to the extent that it will produce all the phenomena that are constantly manifesting themselves in decayed tooth substance. I am also well aware of the fact that there are more problems to be worked out on dental caries before the question is fully settled. The study and researches on the oral fluids, both from a chemical and physical standpoint, are broad fields for future investigations.

I am also mindful of the excellent work of Drs. Acree and Hinkins upon this subject, but they do not pretend to say that dental caries is the result of the action of certain constituents of the saliva. I think their work will tend to show that erosion of the teeth is more likely the result of the acids found in the oral secretions, than it will show that dental caries is the result of the oral secretions. But in all of these chemical and physical experimentations we must not lose sight of two or three of the most important points in the fields of investigation. I have repeatedly published the results of experiments of the morphologic changes that take place in bacteria by changed environments. This is especially true in saliva.

Dr. Wightman states on the first page of his article, "this is impossible, for according to my observations lactic acid formation under normal conditions of the saliva cannot take place. The formation of lactic acid is only possible in the presence of grape sugar." If the doctor had not said "normal conditions" his point would have been much stronger. But I think just this one phase of the subject is the one that brings his hypothesis into question. It is the bacteria that change this whole phenomena of the breaking up of the carbohydrates as well as the mucins. It is these bacteria that would prevent this change that takes place in the normal way.

The doctor farther says, "that on account of the tenacious peculiarity of mucin it readily becomes attached to the fine angles, sulci and fissures of the teeth, and thus concentrated exerts its destructive influence on the teeth." I wish the doctor would tell us how he came to such a conclusion, with reference to this point, and if the mucin mass was free from bacteria. Another point the doctor makes on page 1107: "The crude, coarse bread contains calcium fluorid, which in a dilution of 1-1000 prevents putrefaction. Calcium fluorid is not soluble, but we can accept that its decomposi-

tion takes place between the calcium phosphate and the fluorids."

I would like to ask the doctor if the reaction takes place after the bread comes in contact with the saliva, and I would like to further ask if he can give me his authority for saying that there is this amount of fluorid liberated in the decomposition of bread. Besides, it is my understanding that sodium fluorid is much more soluble than the calcium fluorid, and the best authorities I can find upon this question say that it takes 1-500 to prevent the putrefaction and the quantity of 1-500 would cause great irritation to the mucous membrane. Furthermore, if there was anything like the amount of fluorid liberated, as stated in the above quotation, and it had the action on bacteria therein mentioned, it would be quite impossible for grain in large bins and other places to become moldy, as it is called, which is more or less a form of fermentation, because it is a well-known fact that the hull on grain contains more of the fluorids than any other known substance, and that the decomposition and liberation of fluorids would take place under the circumstances herein mentioned. Further, it would be necessary to get a concentration of 1-1000 of the fluorids in a solution in bread. It would be far beyond any quantity known in connection with any organic substance, so far as any authorities treat upon the subject. If the fluorids that are known to exist were extracted under the most favorable circumstances from ground flour or meal, there would not be sufficient quantities removed from a barrel of flour to make a solution of one in five hundred (1-500) in 20 c.c. of bouillon, the amount necessary to arrest the bacterial fermentation in a solution of bread.

With the above fact before us, I am unable to see wherein we are to disprove the chemioparasitic hypothesis of decay of the teeth, while on the other hand if we study the works of Scholl, Grotenfelt, Weigmann and Krüger on lactic acid fermentation, we will find that decomposition of bread and various other carbohydrates can take place in just these places and under just such circumstances.

In the discussion of this problem I must admit that there are several phenomena that manifest themselves in fermentation, which I am by no means able to clear up in my mind at this time. But I have confined pure cultures of bacteria in a colloidal sack on the

surfaces of teeth with nothing but bread as a culture media and placed these in sterile water, and I found that the bacillus acidi lactici would, and did, produce acid. The cultures of these bacteria were then transferred to larger colloidal sacks containing only bread as a culture media, and after fermentation had been fully established at 36°C., they would produce a sufficient amount of acid so that a chemical analysis of the contents of the sack revealed the fact that this was lactic acid.

Right in this connection there is a point that has never been brought out, and that is in speaking of lactic acid we do so without qualification or reference to the fact that there are several isomeric lactic acids. A strange and peculiar fact is that if we take the bacillus prodigeosus and grow it on a slice of bread at the optimum temperature (37°C.) it will produce its characteristic pigmentation, but if the temperature of the incubator be raised to, say, about 42°C. it will produce lactic acid out of this culture media and pigmentation will not be present.

One of the common culture media for growing certain forms of bacteria is the ordinary coarse bread, the kind, I presume, to which the doctor has referred. But I am quite at a loss to know how it is that we could have this deleterious influence of calcium fluorid in the digestion, or the decomposition of bread in the oral secretions, to the extent that bacteria would not be able to act upon the fermentable substance present in the oral cavity without interfering with the ferments of the saliva.

There are several points in this paper that, if true, will change all the biologic phenomena now known upon the oral secretions. For instance, if calcium fluorid was present 1-2000 in the saliva it would arrest almost completely the fermentation produced by the ptyalin. It also shows that if bread would liberate enough calcium fluorid to arrest fermentation by the action of the phosphates on this calcium fluorid fermentation that is brought about by the normal secretion of the oral mucous membrane would be arrested, for without any question the fluorid would act upon the ferment of the saliva as quickly as it would act upon bacteria. These and many other points are of importance and should be considered in the discussion of the subject.

In expressing my opinion on this most vital question I wish it understood that I am not specially interested in Miller's theory of

dental caries, nor am I prejudiced against the so-called mucin theory. I have been very much interested in Dr. Wightman's article and I only hope that he will publish in detail the technique by which he has carried out his observation in the study of this phase of the problem. Just now I am deeply engrossed in the formation of the mucus of the oral secretion, and I am trying in every way possible to determine what influence the mucus has upon the bacteria of the oral cavity, to just what extent we can say the loss of tooth substance is due to the mucous acids and to what extent it is due to fermentation by bacteria. If the doctor has any technique that he can offer in this line with which I am not familiar, I would be extremely obliged for his or any other assistance upon this subject.

In closing, I want to thank Dr. Wightman for his article, and I believe that in a degree he has accomplished a great deal in his observation; but I do not believe, from my understanding of the subject, that we are in a position to lay all the stress upon the reaction of the mucus to the typical forms of dental caries. I hope that my discussion of the subject will not appear in any sense as antagonistic to any theory upon the vital subject of dental caries. The discussion of the subject is for the purpose of throwing more light upon the various phenomena that we find in connection with this process.

IMPORTANT APHORISMS.

BY L. P. HASKELL, CHICAGO, ILL.

DON'T FORGET:

1. That plaster is always a reliable impression material.
2. That the more difficult the case to obtain an impression, the more necessary the plaster.
3. That the only portion of the upper jaw which never changes is the hard palate.
4. That unless provision is made for the settling of the alveolar ridge, it is only a question of time when the plate is resting and rocking on the palatal surface.
5. That the vacuum cavity is not at all needed to retain the plate, and, also, if used is sooner or later rocking the plate.
6. That the remedy, in a metal plate, is the covering of the

entire hard surface with a thin film of wax (the "relief"). In a vulcanite plate, scraping the impression.

7. That there is no necessity nor advantage in scraping the soft portions of the model in any case.

8. That vulcanite should not be used for permanent upper dentures, because of increased absorption in 80 per cent of mouths on account of retention of undue heat.

9. That the great number of cases of excessive absorption of the anterior portion of the upper jaw and soft ridge arises from this cause, but is greatly enhanced by undue pressure of the anterior teeth.

10. That the anterior teeth in full upper dentures should *never, never,* under any conditions, come in contact for the above reason, and also because the plate is displaced every time the jaws meet.

11. That the fitting of a metal plate is as easy as of a vulcanite, and in flat, ridgeless jaws better success is assured.

12. That a proper Babbitt metal die insures better success than zinc, because it has all of the five necessary qualities for a dental die; viz., non-shrinkage, will not batter, will not break, is smooth and melts at a low temperature.

13. That the melting temperature of the lead for counter-die must be reduced by the addition of tin, one part, to five of lead, and not poured as hot as it comes from the heater, but stirred until it begins to crystallize.

14. That aluminum makes an excellent substitute for vulcanite.

15. That in the question of the extraction of certain teeth, the only thing to be considered is what shall be done to make the artificial denture the most useful and comfortable.

16. That the retention of the cuspid teeth is unwise from every point of view, weakening the denture; the latter is not so easily retained, nor as useful.

17. That there is no necessity for retaining them, because they are practically useless, and the change in the features caused by their extraction is remedied by making the plate higher at those points and the artificial gum fullest.

18. That there are more failures from faulty occlusion than from any other cause.

19. That correct occlusion can better be secured by the use of the thick articulation paper than by any other means.

20. That in arranging the lower to an upper set, begin with the second bicuspids; then the first, so as to secure correct interlocking of the cusps, for in nearly all full sets, of all makes, the anterior lower teeth are too wide for the uppers, and must be changed so as to come within their proper limits.

21. That in taking the "bite," if the tongue is turned back as far as possible the jaw cannot be moved forward.

22. That teeth should always be arranged by the mouth, as it is only there one can determine when they are correct, and also the patient should see them, so if any change is desired it can be made prior to completion.

23. That the numerous cases of flat, narrow, ridgeless lower jaws are the problem of the dentist.

24. That when the tongue is raised the glands and loose integuments rise above and drop over the margin of the jaw.

25. That in such cases, no matter what depth there is on the lingual side of the jaw, the plate should not be extended below the point where it is lifted by the glands, as it is constantly lifted, to the great annoyance of the wearer.

26. That a very common fault with artificial teeth in many mouths is they are too short, no attempt being made to restore the features.

27. That small, white or colorless teeth are too often used, and resemble a row of beans.

28. That the serious fault with all makes of teeth is found in the bicuspids and molars. The lingual cusps should be shorter than the buccal in the upper teeth, and as they are not, it is impossible to bring the buccal cusp into proper alignment without much grinding of the lingual.

29. That the pins, even in long teeth, are too near the cusp when it has to be ground nearly all away, whereas the pins should be lowered, allowing more porcelain and, also, shorter cusps.

30. That too many bicuspids and molars are so narrow and thin there is little surface for mastication.

31. That the continuous gum denture remains, after nearly fifty-eight years, the only ideal artificial denture in all respects.

32. That the prominent upper jaw and short lip absolutely require this work to fulfil all the requirements of the case.

33. That nothing else in prosthesis gives such scope for artistic work, and yet much of it is a disgrace to the maker.

34. That there are seven distinct peculiarities of the left side of the mouth, seldom seen on the right, all of which have to do with the arrangement of the teeth and contouring of the gums.

THE EFFECT OF DISEASE AS SEEN IN THE ORAL CAVITY.

BY BESSIE BURNS BENNETT, D.D.S., BALTIMORE, MD.

It has always been exceedingly interesting to the writer to note the influence of various diseases on the different organs of the body.

Diphtheria, for example, generally leaves the patient with the respiratory organisms weakened; scarlet fever attacks either the organ of sight or hearing; typhoid fever influences the entire system—to use a popular expression "typhoid either makes or mars."

So, having noted these facts, it occurred to me that it would be interesting, as well as instructive, to trace the influence of disease in our own peculiar field—the oral cavity, and note its effects upon hard and soft tissues.

That disease does affect the teeth, is proven beyond doubt by the influence of the exanthemata upon calcification.

In my own practice there are illustrations of this. One entire denture, with the exception of the second molars, is excellent in structure, dense and with that healthy glow that is found only in strong, well-cared-for mouths; but the second molars present a "much-filled" appearance. The tooth structure visible being of that opaque, cloudy character which denotes imperfect calcification. This condition I attribute to an attack of scarlet fever when the patient was about six years of age.

Another patient would be an exceedingly pretty woman were it not for the legacy from a severe attack of measles in early childhood, which she bears in her incisor teeth. These teeth are so badly calcified as to present, at first examination, the appearance

of Hutchinson's teeth; but upon judicious questioning as to family history, etc., I have concluded that the condition is due to the attack of measles, as the family record is clear from taint, and the incisors alone are affected.

Speaking of Hutchinson's teeth, here we find a most direct result of disease, which at the same time is a safeguard to the operator.

While gestation and menstruation may not properly be termed "disease," still they are not the usual state of the body, and, during their continuation, the sensitiveness of the dental mechanism is exquisite. That this is true is well known; the reflex nervous action being so great during gestation especially, that, if possible, we postpone operations until after the seventh month, or, better still, after delivery.

The cause of this is not evident.

One of the best authorities in the United States upon gynecology, in reply to my letter asking for information upon this subject, said: "The explanation lies hidden in vital processes of which we have no knowledge."

That uterine diseases cause an affection of the teeth closely resembling pyorrhea I am convinced, for several cases in my practice have tended to prove this; and after treatment by the family physician and continued massage of the gums to assist the capillary circulation and to hasten a return to a healthy condition of affairs, the teeth again became firm in their sockets, although, as in pyorrhea, the gums did not return to the original position about the necks of the teeth, there being a slight shrinkage.

In my examinations in hospitals to gain data for this subject, I found several patients who had just undergone uterine or ovarian operations. In each case the same history was recorded; that of loosening of the teeth and their consequent loss. In one case the few teeth remaining were firm, though badly decayed and with receded gums. The saliva in each case was exceedingly acid.

Without exception, in cases of severe rheumatism, all chronic but one (which was the first attack), each oral cavity presented the same conditions: Calculus, spongy and inflamed gums, teeth of very poor structure, and, in some instances, the presence of pyorrhea. The patients stated that the teeth which were missing had loosened and dropped out.

In one typhoid case, which was just reaching the crisis, the mouth was so dry as to be scarcely able to moisten the litmus, yet the trace of moisture was so acid as to react immediately upon the paper. The teeth were covered with peculiar sordes, resembling the film of collodion.

In several other cases of typhoid, the patients convalescing, the teeth were fairly good; but the saliva scanty, acid and thick.

In one case, having undergone an operation for the removal of cancer of the breast, conditions resembled those in uterine disturbances, the teeth having loosened from recession of the gums, and finally dropped out. The membranes were tumid, but the few teeth remaining were firm.

In three cases of stomach trouble, the patients having suffered from various forms of indigestion, the teeth were very poorly calcified, badly decayed, the oral membranes inflamed and saliva acid in reaction. Questioning the patients revealed the fact that conditions had always been similar.

In the various forms of nervous trouble, sympathy from the fifth nerve asserts itself so forcibly that dental operations, for some "neurasthenias," seem almost impossible. Here again, for explanation, must we look to the hidden vital processes which still baffle the scientists.

Patients having a tubercular family history, as a rule, have the blue-white, frail-looking teeth of the nervous type; however, I have noted the fact that sometimes this characteristic may escape one generation; the father, for instance, in a family wherein consumption is hereditary, having the firm, dense teeth of the phlegmatic type, while his children present the frail, poorly calcified teeth, which yield so readily to the ravages of decay. In individuals of tubercular history I have also noticed extreme thinness and brittleness of the enamel.

Of a score or more of cases of children suffering from spinal deformities of tubercular or syphilitic origin, I found the teeth themselves to be in a normal condition, with two exceptions; yet the saliva of a large per cent of the number was thick, ropy and acid in reaction, also scanty in quantity.

The two exceptions presented unusual conditions.

One was a girl of eleven years of age suffering from an extreme spinal deformity; history, tubercular.

In the upper maxilla all the deciduous teeth were in situ, also the first permanent molars, badly decayed.

In the lower maxilla the permanent incisors and the right first permanent molar were the sole occupants, the deciduous teeth and left molar having been extracted to "cure toothache."

The other case was of a boy nearly eight years old, with his entire deciduous denture firmly in position with no indication of the coming of the permanent set. Indeed, the oral membranes presented a decidedly anemic appearance, rather than the redness and slight swelling indicating the eruption of a tooth.

A case of my own—that of a girl nearly sixteen years of age.

When she came to me her deciduous superior cuspids were still in position, the permanent ones far up in the gums, and at least nine portions of deciduous teeth were still firmly fixed between the permanent ones.

The two hospital cases were of tubercular origin; this patient of mine is of a family who all die from consumption. Are three cases sufficient to direct study along the line that tubercular disturbances may cause such a change in the bone surrounding the teeth as to cause tardy eruption?

I am quite sure it affects the teeth themselves.

Trace the effect of the ordinary ills of life.

Children who are anemic during early childhood (when the teeth should have during their calcification the benefits derived from rich, pure blood) present poorly calcified teeth, lacking the luster of well-nourished dentures, and presenting, under the bur or excavator, those pitfalls—areas of uncalcified material, which are such a helpmeet to decay and such a horror to the operator.

Patients sometimes present themselves suffering from acute neuralgia, and begging that the teeth be extracted, nerves devitalized, or what not.

The larger percentage of these cases will appear anemic, and, upon questioning, you will find the system is run down, appetite lacking, sleep broken, all the symptoms of nature crying out for assistance.

Neuralgia is one of nature's danger signals. A visit to the

family physician, or, if the patient be needy, a prescription from the dentist for a good tonic (Gray's glycerin tonic is excellent for the purpose), and the continuance of this tonic until normal conditions are restored will be the only positive means of eradicating the neuralgia.

Severe cases of tic-douloureaux, which occurs at regular intervals, have been known to have been appreciably lessened by a course of tonics just preceding the time of the visitation.

In smallpox, hysteria, hydrophobia and scurvy salivation is marked; indeed, it is said in confluent smallpox if salivation cease abruptly death will ensue.

Salivation is also the chief symptom in mercurial poisoning.

In salivation, as we all know, the parotid is the chief gland affected; and saliva is so abundant that at times several pints are secreted in the course of a day; the gums become swollen and ulcerated; the teeth loose and painfully sensitive to touch, mastication being almost impossible.

Many diseases herald their approach in the mouth; without the tongue, medicine must needs make a new pathology, and of how many phases of disease is stomatitis symptomatic?

That the entire human economy is closely allied and influenced by those organs fed by the fifth nerve is beautifully illustrated in infantile dentition; during which time tonic and clonic spasms, neuralgia, intestinal disturbances, affections of the eye and ear and a number of other painful disorders are prevalent.

So, it being a poor rule that will not work both ways, if the fifth nerve be so closely associated with the nerves influencing other organs as to cause such various systemic disturbances during dentition, it is only natural that these nerves in turn, when diseased, will demand sympathy of the fifth.

Farsighted astigmatism, I am told, is often associated with neuralgia in the lower molars and bicuspids.

That the neuralgia is a reflex from the ocular trouble is proven by the fact that when people wear glasses to correct the refractive strain, the neuralgia disappears.

In acute trouble of the middle ear, where the mastoid is involved, patients often experience severe neuralgia in the upper molars.

Upon perforating the drum, thereby relieving the pressure by discharging the pus, the neuralgia also disappears, showing it to be without doubt a reflex.

Vice versa, the teeth are responsible sometimes for trouble of an aural character by reason of unhealthy secretions from decay and decomposing food matter, and the results of pyorrhea, which influence the mucous and salivary secretions that flow back into the pharynx.

Congestion is caused, and the air which is supplied to the middle ear by means of the eustachian tubes is cut off on account of the closing of the latter.

Thus, there now being a partial vacuum in the middle ear, there is consequent suction, the drum impinges upon the needed space, the ossicula ride over each other, and a feeling of fullness, some pain and tinnitus is the result.

Further, just as the teeth are influenced by diseased conditions of the body in general, so they act reflexly upon themselves when in a diseased condition.

In the presence of sensitive cavities of decay and of members sore to the touch from pericemental disorders, mastication is very poorly performed, if at all; also, decay is always productive of an acid, so that the bolus of only partially masticated food is of an acid rather than an alkaline character.

The stomach, then, must do double work—it must act upon a mass which is acid instead of alkaline, which decreases the amount of gastric juice secreted, and it must also act upon a mass that is merely broken into pieces, rather than having been finely comminuted.

Digestion, therefore, being hampered from the outset requires a longer time for its function, and the products of digestion are lacking in the richness of quality which characterizes the perfect product.

As these products ultimately become the blood, the tone of the circulation likewise becomes lowered, and not only the teeth but the entire system suffers.

Thus we see that the dental mechanism already weakened by disease (meaning dental disease) is further weakened in vitality

by the poverty of the blood supply and made more susceptible to the further ravages of decay.

The research attendant upon the writing of this article has been most fascinating to the writer and had time permitted much more could have been said. Many times have I wished that I had all the wisdom of the sages at my command, that I might prove *conclusively* to the medical as well as the dental profession that we do not spend long years in the acquisition of our knowledge, long days in the perfecting of it and long hours in the application of it merely for the benefit of the teeth themselves, but for the betterment of the entire human economy.

Haste the day when dentistry shall be known, not only as a branch of medicine as it now ranks, but as one of its *foremost* specialties.

VENEER INLAY.*

BY W. CLYDE DAVIS, M.D., D.D.S., LINCOLN, NEB.

I wish to call the attention of the dental profession to an inlay which might be called a veneer inlay, some of the features of which, especially as to methods of construction, I believe to be original.

Whenever something new is taken up by our profession we are likely to attempt to apply it in every case presented and not always with the best of results. This is true of the craze for inlays of all kinds, yet we are settling down to their application in their legitimate field.

It is probably true that there is not yet before us a better filling material than pure gold, for undoubtedly a greater per cent of permanent fillings have been made of this material than any other, due largely to its ductility, whereby we may burnish its margins to a perfect adaptation, whether it be a built-in filling of gold alone or a combination with cement, or the cemented inlay.

The legitimate field for gold inlays will eventually be in cases where a large amount of tooth substance has been lost; and, if they finally become of universal use, they must be demonstrated to be more permanent than the built-in filling, they must take less time

*Written by request for the DENTAL DIGEST.

of both patient and operator, and if they require less gold it will add materially to their popularity.

These advantages can never be attained in the case of small fillings, especially those where convenient access is difficult to obtain, not even with the cast inlay, for many are the operators who can and do insert a small gold filling, since the introduction of quick-working golds, in very little more time than it would require to make and invest the wax mold for a cast inlay, which is without doubt the quickest method yet before us for inlays. Should we insist on the virtues of a cemented joint these operators would reply: "We would first give the cavity the usual mechanical retention and build the filling into a film of soft cement, and we have your inlay beaten in every point as to speed, retention and certainly it is as lasting, for we have retention in all directions."

But when it comes to large restorations it is different, as the fused inlay can be more quickly made than a filling with a plugger point, hence less tiresome for both patient and operator; and, by the method given below, with about one-third to one-fourth the gold generally used either in the inlay or the built-in filling. In cases where the teeth are commonly crowned the filling should weigh scarcely more than a shell gold crown.

This filling may be made either by the sweating process upon a matrix or the casting process, and for a cavity that has all of the retentive form and unevenness of outline ever desired or met with in the usual procedures in any built-in metal filling.

Take any large cavity, wherever located, either simple or complex, prepare the cavity in the usual way as for the reception of an amalgam restoration, except the cavo surface may be more extensive if desired and the cavo surface angle more obtuse because of the superior edge strength of the inlay. The cavity should be retentive in all directions and may possess acute line and point angles. Next warm a sufficient quantity of "Metalline" (a new substance to be had at most dental depots) and pack the cavity with same until you have, as a rule, filled all that part of the cavity formerly occupied by dentin. Circumstances and the taste of the operator would modify this amount in some cases, but as a rule that should be about the amount. This will leave a remaining cavity, for which it is an easy matter to make a matrix, if that method is to be used. Before burnishing matrix or taking impression the Metalline

should be flooded with a jet of cold water from the syringe. When the matrix has been superficially burnished it should be removed, coated with whiting on cavity side, and the external surface covered with a thin film of pure gold, then returned to cavity and finally burnished. Patient may be dismissed with the Metalline in the tooth and return for final setting at a subsequent time. Again coat cavity side of matrix and proceed to sweat up to proper contour as to cusps and contact point. The result will be a veneer of gold not unlike the shape of the lost enamel.

Next solder a suitable square platinoid bar, either straight, curved or looped at two advantageous points so that it will pass through the body of the cavity.

When the patient returns, warm the Metalline in the tooth with a blast of warm air, entirely remove, fill cavity to overflowing with cement and crowd inlay to place, by means of one or two sharp blows with a mallet on a wooden stick. Should your matrix have been a slight misfit, as all that I have ever seen are, there will be sufficient give to the margins to settle the inlay to a close adaptation.

By the casting process there is no change up to the point of using the matrix. When the Metalline has been placed in position, restore the remaining portion with the special wax furnished with the casting outfit. When fully carved, remove and put into position your platinoid bar, pin or staple, whichever suits the case, securing same with wax at its ends. Bar should be slightly warmed so that it will settle a slight distance into the wax. Invest and cast in the usual manner and filling will come out with bar in proper position. Those who desire may leave out bar and solder into position, as in the case with the matrix inlay, or in place of the bar, form a small roll of the casting wax to the desired shape and attach to the wax inlay at its two ends the same as with the bar. This will cast the same as the inlay. This plan will not alloy the pure gold should you desire to recast, and is the best method when giving table clinics and the inlay is frequently refused.

When completed, as described before, the result is an inlay of sufficient strength to sustain a bridge. It rests in a cavity of the usual retention and the cement around the bar is more than ample. The quantity of gold used is materially lessened, a point not to be ignored by the frugal.

Lastly, should the pulp canals subsequently need attention you have not a large mass of gold to penetrate in order to reach them, a point one will appreciate if, perchance, they have ever gone through a solid inlay over an inflamed pericemental membrane.

THE RELATIONS OF THE DENTAL ARCHES TO PATHOLOGIC AFFECTIONS OF THE NASO-PHARYNX AND ADJACENT PARTS.

BY E. A. BOGUE, D.D.S., M.D., NEW YORK CITY. READ BEFORE THE SECTION ON DISEASES OF CHILDREN, AMERICAN MEDICAL ASSOCIATION, AT ATLANTIC CITY, N. J., JUNE, 1907, AND PUBLISHED BY COURTESY OF THE JOURNAL OF THE ASSOCIATION.

It is singular that a science or an art may progress for centuries on the borderland of important discoveries and fail of making them.

Adenoids were discovered only a little more than fifty years ago. The proper, normal arrangement of human dental arches was dis-

Fig. 1. Normal dental arches showing the articulation of the teeth when in correct occlusion.

covered less than twenty-five years ago. The intimate relation between these two discoveries has just begun to be understood. Until normal dental arches were discovered we did not know what proper mastication was nor the conditions necessary to its performance. These conditions comprise the full set of adult teeth standing in proper relations to each other.

Now that we know something about the proper size and relations

Figs. 6 and 7. Two skulls with apparently perfect dental arches; 6 is according to measurements; 7 is too narrow. The nasal fossæ in 6 are ample; in 7 they seem insufficient; 6 must have been the skull of a vigorous person with a resonant voice, who lived to middle age, at least; 7 belonged to an individual who was frail and delicate and who died before reaching twenty years of age.

of the dental arches, we know how mastication should be performed to get the greatest degree of vigor from the food we consume, and we know what steps should be taken to permit the child afflicted with adenoids to close its mouth.

Dr. I. B. Davenport of Paris discovered in 1886 what normal dental arches were; also that in civilized communities normal den-

Fig. 8. Showing result of the withdrawal of the tongue of a mouth breather from its place in the roof of the mouth, confining its action to the mandible.

tal arches were rare. A few years afterward the late Dr. Bonwill of Philadelphia discovered that a mathematical relation existed between the width of the permanent upper central and lateral incisors and cuspid and the entire arch, and from the measurements of these three teeth he was able to construct the entire arch as it should be when normal (Fig. 1).

When thus normally arranged it is found that all the teeth growing in one jaw articulate with the teeth of the other jaw so as to furnish the largest area of grinding surface. The cusps and the sides of the cusps, and the sulci into which they fit, all combine to furnish not only the best masticating surfaces, but to form dental arches that for strength and durability cannot in the human species be excelled. The cusps of all the grinding teeth in such arches,

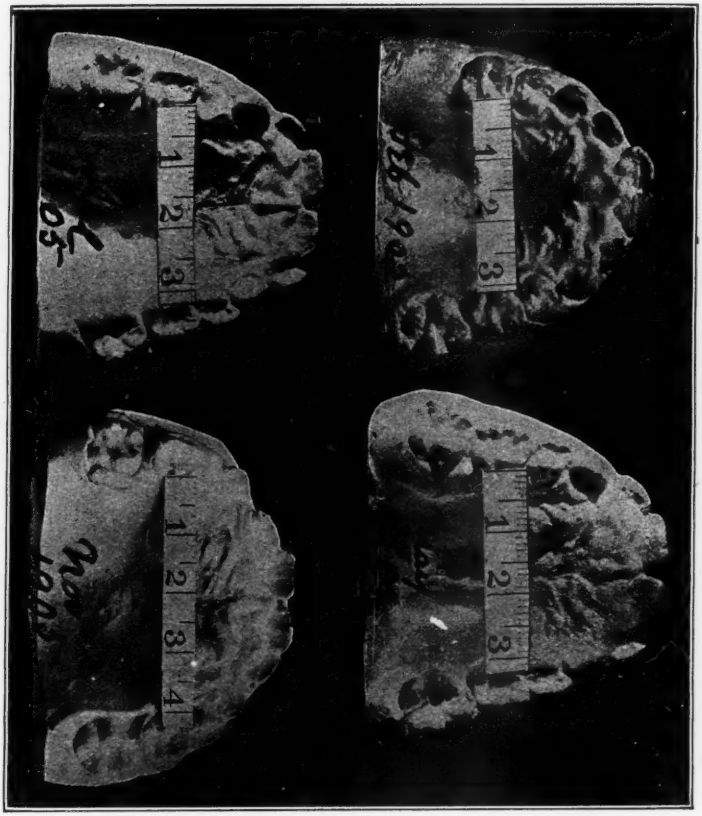


Fig. 9. Four models of the same mouth showing scarcely any lateral growth for three years and a lateral enlargement of 1 cm. in seven months after an expansion arch had been adjusted.

interlocking with their antagonists, prevent any variation in position of any of the teeth either laterally or anteroposteriorly.

Dr. Hawley of Columbus, O., recognizing these facts, adapted Dr. Bonwill's discovery to the use of the orthodontist. The result is that to-day by measuring the width of one upper central incisor we may determine approximately the shape and size of the arch in which that tooth belongs, and may draw it on paper so accurately that we may work to that arch with confidence. If there is any slight variation in the sizes of the various teeth in the same mouth, we work up to the model. Nature will make all proper correction in the way of diminution and adjustment to type without assistance, and at the same time without any injury to size or strength or the adaptation of the arches to each other (Figs. 6 and 7).

When, therefore, irregular teeth and narrow dental arches are found, with the characteristic physiognomy that we all recognize as associated with adenoids, we expect in nearly all cases to find not only nasal stenosis, but that the irregularity of the teeth is in proportion to the degree of deflection in the nasal septum and diminution in the nasal passages.

Having had this idea impressed by clinical experiences, I went in March, 1905, to the Smithsonian Institution at Washington and spent a week examining skulls, mostly aborigines, together with a number of children's skulls of mixed origin. I carefully examined all of the children's skulls and as many of the adult ones containing fairly good sets of teeth as I could master in that length of time. In all the skulls that I examined a pronounced deflection in the nasal septum was invariably accompanied by an irregularity of the dental arches, greater or less according to the deflection of the septum.

I had not time to examine carefully with the necessary measurements as to whether the height of the palatal arch bore in all cases a direct relation to the irregularity of the teeth, and, therefore, consequently to the straightness of the nasal septum. In a number of cases, however, I felt sure that this was the case. I think that a high V-shaped arch of the palate becomes lower by spreading slowly the arch of the upper teeth laterally to their correct normal positions. In a growing child, however, the ordinary arch may become higher from spreading, but from the limited length of time in

which these cases have been under observation no more positive statement can yet be made.

As I have learned to look on the etiology of lymphoid growths as being generally identical with that of more or less narrow dental arches, I shall associate the two affections in our consideration.

I want to show that if taken early, say at about the sixth or possibly the seventh year, the correction of irregularities in the positions of the temporary teeth corrects impending irregularities in the permanent teeth. That process results not only in an enlargement of the dental arch, but, so far as is now known, in a straightening of the nasal septum by spreading the upper maxillary arch, gaining a consequent enlargement of the nasal passages and incidentally of all the adjacent bones of the face, nose and head.

I want to show, too, that the diagnosis of impending irregularities in and among the permanent teeth is almost as clear at six years of age or earlier, while the temporary teeth are still in the mouth, as at twelve, when the permanent teeth are visible.

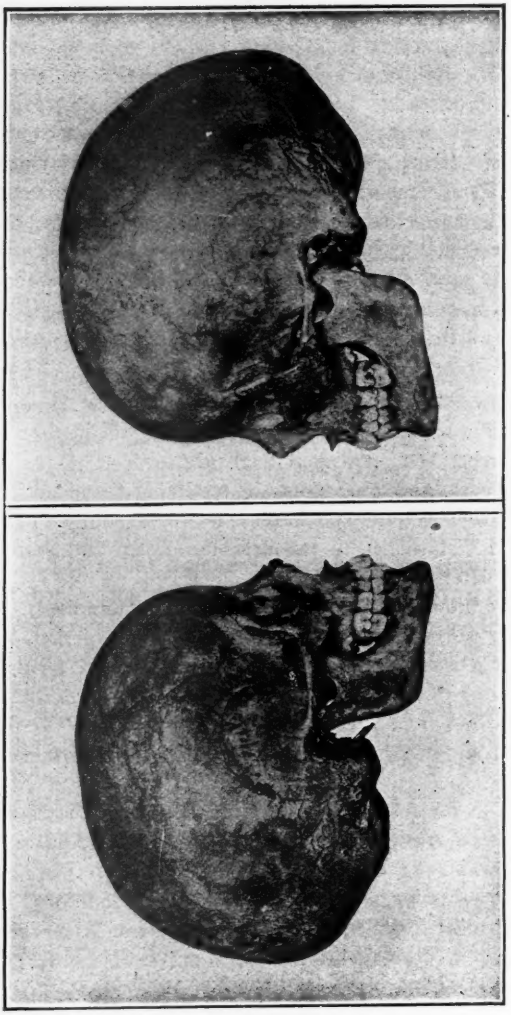
I wish to show that operations for rectifying the conditions above mentioned are more safely performed, with less pain, with apparently less general disturbance to the nervous system and more quickly than at any later period in life.

These operations, performed thus early, are more likely to remain permanently successful than if done at a later period, and they have an influence which we can but little appreciate on the permanent well-being of the individual in after life. Vocalization, enunciation, mastication and breathing are brought nearer to perfection than they would otherwise be, and the personal appearance is much improved.

It seems to me that in many, if not most, of the cases of contracted arches and adenoids, influences that came into operation after birth, and which we can understand much better than we understand heredity, are largely responsible for these conditions.

The statement that the tongue within, and the cheeks and lips without, are the main instrumentalities in the formation of the dental arches from the early stages of embryonic life right on until maturity is not by any means new; yet few practitioners realize the muscular and mechanical power of the tongue.

A few days since I undertook to prevent a lad of ten years



Figs. 12 and 13. Two sides of the same skull. Articulation incorrect on one side (Fig. 12) and correct on the other (Fig. 13).

from placing his tongue over a tooth that I wished to examine. Three fingers and my thumb holding a mouth mirror were unable to control its movements. This muscular organ, when the mouth is closed, lies against the roof of the mouth, and as it grows its lateral enlargement presses the dental arches outward, and so enlarges the upper jaw to its proper size as well as the lower jaw or mandible against which it is always pressing (Fig. 8). Inflammatory conditions, coupled with this withdrawal of the tongue,

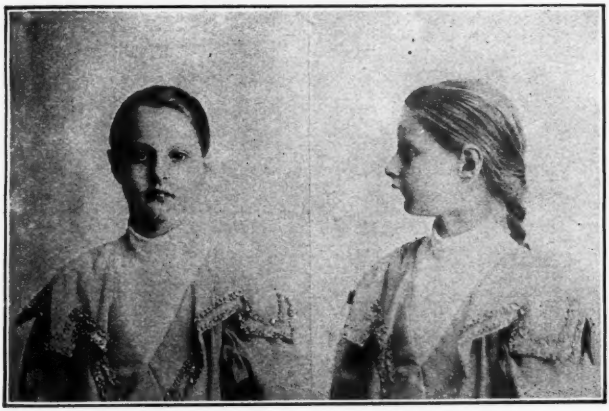


Fig. 14. Showing progress made in about four months by a patient. Appearance of patient at time of applying apparatus, Oct. 27, 1906.

inevitably arrest the development of these parts. The cysts of the permanent teeth remain bunched in their insufficient spaces, and year after year goes by with scarcely any perceptible variation in the width of the upper jaw (Fig. 9). The attending physician may advise an operation. But usually, long before the mother consents to surgical interference, the arrest in development of the jaw, nose and adjacent parts has been established.

The constant breathing through the mouth, the dragging influence of the muscles of the jaws and cheeks, all combine to keep the arch of the jaw narrow and to prevent the healthy normal flow of lymph. But worst of all, this mouth-breathing causes the withdrawal of the muscular and pushing tongue from its place in the roof of the mouth, where, by the growth and constant pres-

sure of that tongue, the lateral growth of the upper jaw is promoted.

This withdrawal of the tongue not only allows the arch of the jaw to remain narrow, but it causes the eruptive force of the teeth to be expended in an anteroposterior direction. From the time mouth-breathing is established, lateral growth is almost excluded till relief is afforded by surgical means. Surgical interference will, of course, generally be considered necessary, and might mean

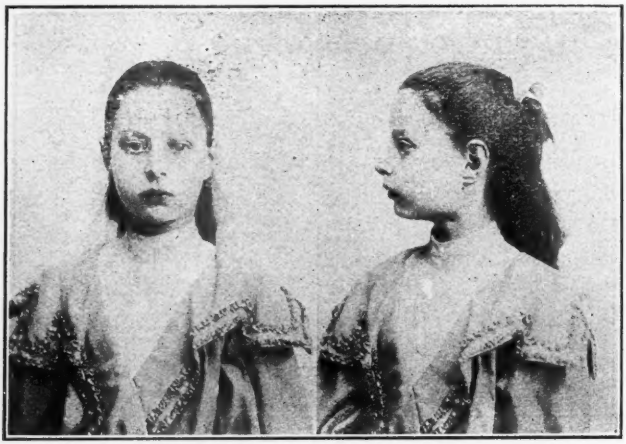


Fig. 15. Same patient as shown in Fig. 14 after wearing apparatus. Taken Feb. 22, 1907.

either an operation on the adenoids, or the faucial tonsils, or both, or the relief afforded by orthodontia, or all three.

If orthodontia is resorted to, either before or after operation for adenoids, and the operation can be begun about the sixth year, the crypts of the upper bicuspid teeth will at that age be lying embraced by the three roots of the deciduous molars, and will themselves have no roots.

When, therefore, the deciduous molars are moved into the positions they ought to occupy they carry with them these crypts of the permanent teeth, which, after the deciduous teeth have fallen out, develop their own roots in the positions to which they have been transported and become rooted there. No injury has been

inflicted on the permanent teeth by the appliances used in orthodontia and the retaining appliances, being attached to the deciduous teeth, fall off when these teeth are lost, having fulfilled their function of retaining in position the teeth that have been moved until they have become firmly established.

The operation on tonsils or adenoids alone is not always successful in restoring nasal breathing. Just recently a lad of about eight years of age, who had been operated on twice for adenoids, still continued to breathe through the mouth until an expansion arch was placed on his teeth, when in a few weeks, without his attention having been called to it, he voluntarily closed his mouth and began breathing through his nose even in sleep.

While the adenoid operation in cases of narrow arches is not always successful in restoring nasal breathing, it is never successful in restoring the harmony of the features, the power of correct articulation, or the power of thorough and normal mastication. This requires a special operation, an expansion laterally of one or both dental arches, and a bringing into articulation and—so far as possible—into regularity all malarticulated teeth.

This process, as already stated, when undertaken at a very early age, tends toward a normal enlargement and development, not only of the upper jaw and the nasal passages, but of the other bones lying above the upper maxillary, thus ensuring greater regularity in size and position of the antra and all the other sinuses of the face.

The early diagnosis of cases of irregularity is readily made if one carefully notices the articulation of the deciduous molars (Figs. 12 and 13). In normal cases the articulation is always correct; that is, the anterior cusp of the lower second deciduous molar articulates forward of the corresponding deciduous molar above, and the upper molar is astride the buccal row of cusps of the lower molars.

Whenever these upper and lower deciduous molars articulate in any other way than this, there is sure to be irregularity in the permanent teeth if they are allowed to develop without interference. The reason for this is, as has already been shown, that the crown of the permanent tooth is embraced by the roots of the deciduous molar.

If the first permanent molars, which erupt immediately posterior to and in contact with the second deciduous molars, are not properly articulated, it will be impossible that the other grinding teeth should be. If the upper arch is abnormally small, we may be certain that there will not be room for the anterior permanent teeth unless an enlargement of the arch is resorted to.

If such enlargement takes place sufficiently early for the roots of the permanent teeth to be formed after their crowns shall have been drawn into correct positions, there will never be irregularities in the positions of these teeth, and it follows, of course, that they will stay where they belong.

The articulation of regularly arranged permanent teeth, when all the members of the arches are present, is such that nothing short of a fracturing force can dislocate them. The regularity of the teeth in normal arches is also one of the chief factors in their resistance to decay, for the teeth are then in position, if they are properly formed, to be practically self-cleansing, if the food taken in is of the right sort and is thoroughly masticated.

Dental decay always comes from agencies external to the teeth; so if they can be kept clean automatically or otherwise, there will be no decay. Defects in formation, of course, preclude the possibility of automatic cleansing.

NITROUS OXID IN GENERAL SURGERY.—A growing appreciation of the possibilities of nitrous oxid as an anesthetic in other than purely dental operations to which its use was long restricted is a significant feature of recent anesthetic practice.

The employment of nitrous oxid as a preliminary to the administration of ether or chloroform, or in combination with those agents, is now with many anesthetists a routine practice, the advantages of which in lessening discomfort, if not in diminishing danger, have been fully demonstrated. A further and more hopeful advance is the increasing use of nitrous oxid in combination with air or oxygen; the latter method having been first suggested and practiced by Professor Paul Bert, followed by Hewitt of London, Martin of France, Hillischer of Vienna and many others. With increasing experience in the induction of anesthesia with this combination has come a progressive enlargement of its range of application, until its efficiency and safety in prolonged surgical operations have been fully demonstrated.—EDITORIAL, *Dental Brief.*

Digests.

THE PERICEMENTAL MEMBRANE. By Dr. Geo. W. Cupit, Philadelphia, Pa. The pericemental membrane is the fibro-vascular ligament or sheath surrounding the entire root of the tooth, and is the membrane by which the root is attached to the bony wall—the alveolar process—which in turn is a temporary structure of bone projected upon the maxillary bones encasing the roots of all the teeth. This latter is but temporary, and while resembling true bone is much more vascular, cancellated and less dense, having for its function that of supporting the teeth and, when the latter are lost, is soon absorbed, owing to a complete loss of its function. The pericemental membrane is placed between this process and the roots of teeth. It is a formation from the rather embryonic structure about the developing tooth, evolved from the follicular wall inside of which tooth calcification and formation go slowly on.

As the end of the process of calcification draws near, the embryonic structure, of a loose cellular nature and very vascular, undergoes a change in its morphology, the cells becoming specialized into fibrous cells, endothelial cells, nerve cells, etc., the first of which predominate, and tissue of the nature of a ligament soon develops, surrounding the now forming tooth.

With the completed deposition of dentin and complete formation of the tooth with its roots, the pericemental membrane, now established as a regular functionating structure or organ, assumes its first or original duty as a tooth-forming body; and certain cells of its structure, known as osteoblasts or bone producing cells, begin the deposition of calcoglobulin for the formation of the last part of tooth structure to be calcified—that of cementum or bone-covering of the roots. This cementum is a sheath of bony substance, the softest of the three calcareous structures of the tooth; the enamel, the first and hardest and most beautiful of all organic tissues; the dentin, the second, which forms the body and greater portion of the tooth, giving the tooth general form; and the cementum, the last, or sheath upon the roots and covering the dentin of these portions of the tooth, is for the

specific purpose of giving attachment of the tooth to the jaw. In the deposition of the cementum and its calcification, the very cells which deposit the cement-substance, together with the fibrous cells of the pericementum, are caught in the process and are calcified with the cementum and in its substance, thus giving upon the tooth side of this membrane the strongest possible attachment to the tooth.

It thus becomes one of the structures of the tooth and is always a part of the tooth, coming away with it in its extraction.

The pericemental membrane is in truth a double membrane having this strong ligamentous attachment on the tooth-side, but resembling more closely the periosteum on the side toward the alveolar process; upon this side it is, in fact, a true periosteum, giving support to the tooth and attachment to the alveolar bone and at the same time partly nourishing the alveolar bone which it covers.

From its position, the pericemental membrane is liable to injury in many ways. One of its functions is to resist the strain put upon a tooth in the process of mastication, and if undue pressure or sudden force in biting upon a hard substance is made, it must result in injury to the pericemental membrane, setting up inflammatory action and often causing serious disturbance in this organ.

Blows, fracture of a tooth, careless use of the teeth, abuse, etc., are some of the causes of injury to the membrane. These being traumatic may cause only an active inflammation, from which recovery may soon take place. If, however, congestion results and degeneration of the blood so congested, and infection occurs, a suppurative and destructive inflammation follows, and in addition to excessive pain and suffering in such cases, complete loss of the membrane by abscess, and sometimes of the tooth, in consequence follows.

The pericementum is very susceptible to infection and the degenerating processes resulting therefrom in teeth affected with caries encroaching upon the tooth-pulp and where putrescence of the pulp has resulted from exposure and death of that organ. Highly infectious matter is passed or forced through the apical

foramen of the root out into the apical space and into and upon the pericemental membrane at the apex of the tooth. This is the usual cause of abscess. The infective inflammation attacks the membrane, and being confined as it is in its narrow space between the root of the tooth and bony process, exudations cause intense pain, excruciating in severity, and relief comes only when the exudations and infection have reached the soft tissues of the gums, the lips and the cheek.

The most common cause of inflammation and the degenerative processes of the pericementum is the accumulation of food particles, calculus, and other waste products about the necks of teeth, giving rise to irritation of the gingival or gum-margins, inflaming the latter, causing congestion of the gums; the result of this congestion is a retarded circulation in the gum tissue, the degeneration of the blood and the formation of serumal deposits, the accumulation of the calcium and sodium urates and the calcareous degeneration of the blood. These in turn are violent irritants to the soft tissues, which increase the inflammatory action and institute a progressive degeneration of the gums, periosteum, pericemental membrane and the alveolar process.

Blood in a state of degeneration becomes decidedly acid in reaction, is irritating and causes sensitiveness and decalcification of the tooth surfaces. Hypertrophy, hyperemia and inflammation ensue and a general degenerative and destructive action of the surrounding tissues takes place, with recession of the gums, alveolar process and the pericementum. Infection of the destroyed tissue naturally occurs, an accumulation of waste products attends the whole process and an offensive and ineffective, purulent discharge is noticeable, which contaminates the food pabulum and unfits it for nutrition. The teeth so affected become loose from a breaking up of their attachment and sore from irritation and loss of function which attends not only the affected teeth, but others in their vicinity, and sometimes of all the teeth on this side of both jaws, and mastication by them is impossible. Further destruction of tissue surrounding the teeth results from this loss of function and systemic disorders and often derangement of the entire alimentary tract, so that a literal poisoning of the system follows in consequence of the pyorrhea. Unless decided

measures are taken to correct the condition, the teeth will soon loosen and come out, or from the pain and discomfort resulting from the looseness, are from necessity extracted. And strange as the statement may seem, by far the greater number of teeth lost are lost from this insidious and progressive or rather retrograde metamorphosis consequent upon inflammation of the gums and pericemental membrane.

Diseases of the pericementum have been wisely classified, and by no less an authority than G. V. Black, into three varieties:

Those which have their origin at the cervix or gingiva; those which begin at the apex of the root; and those which occur in the central portion of the membrane, or some intermediate part between the apex and the cervical border of the tooth.

Nearly all the cases which have their beginning at the apex are directly due to an infection (bacteria—pyogenic organisms of the pneumococcus, streptococcus, staphylococcus and the more common variety diplococcus prevail) from the decomposing and putrescent contents of the canal of the tooth following the death of the pulp.

These cases result mostly from neglect. The pulp substance, together with impacted food, undergoes decomposition and becomes highly infective. This infection is confined within the canals and readily finds its way or is projected into the apical space, setting up an acute infection of the pericemental membrane covering the apex of the tooth. Confinement again within this area leads to further progress of the disease and septic inflammation of the membrane continues, often throughout the whole organ, and an active and acute septic apical pericementitis is the condition. This is often miscalled alveolar abscess. There probably never is in the various phases of an abscessed tooth, any abscessed condition of the alveolar bone, but simply a boring through the alveolar wall by the abscess-sac by reason of the action of the giant cells upon the outer surface of this destroying membrane—the sac—carrying the destroyed tissue, the dead leucocytes, destroyed cellular connective tissue bone cells and gum tissue and known as pus, toward the surface upon which it is to be discharged. Beyond this, the different stages of a developing abscess would be somewhat irrelevant to our subject. We may,

however, to advantage consider the morphology or morbid anatomy of the pericemental membrane during the progress of the disease which has its origin at the apical end of the tooth-root. Infection from the canal finds its way into the tissues of the pericementum. Abundant exudations of a fibrinous and coagulable nature pour out into the intercellular spaces of the membrane; the tissue softens and swells about the apex, and exudations of blood cells and leucocytes take place; proliferation of the cells of its tissue ensues, and the tooth, by reason of a thickening of the pericementum, is pushed slightly from its socket. With this pathology the nerve cells of the membrane become highly sensitive—hypersensitive—and from pressure by the hyperemic vessels and the exudations, pain attends its first symptoms. With an extension of the inflammatory condition radiating from the focus of infection throughout the whole membrane, pain and pressure increase until in the more advanced stages the slightest percussion or pressure upon the tooth affected becomes unbearable.

Great destruction of cellular tissue, of soft and bony structures, and of the leucocytes takes place and its accumulation, on confinement within a developing sac wall (which is a process of demarcation from normal surrounding tissue), leads to its escape along the path of least resistance and the condition is known as abscess.

The cases which have their origin in the body or central portion of the pericementum are comparatively few and are not so important. In nearly all cases they are due to a form of infection which reaches the membrane by way of the general circulation. Infective matter is carried directly to the vessels of this organ and a septic inflammation follows. Or by reason of injuries to the membrane by force or blows, or the too sudden strain upon it by suddenly biting upon hard substances, causes an engorgement of the vessels or even rupture, and the effusions resulting undergo a degeneration, and an infective inflammation is the consequence. Phagadenic pericementitis is induced from such causes, the process being a slow degenerative one; a microbiotic action with slow degeneration of an area or of different areas of the membrane.

This has been given the name of phagadenic pericementitis, or an eating away of the membrane by a very low chronic form of inflammation. In other words, it is the slow passing away of the life of this organ.

The cases which originate at the cervix or gingival margin are more common than any of the other classes and should interest and concern the operator probably more than any branch of his work. For one reason principally they are important. The duties of the operator are mainly the conservation and preservation of the natural teeth. All of his work should tend toward this end. In proportion as he is able to preserve the natural teeth in their various relations and functions, just so in proportion is he successful or unsuccessful. Now since we have learned that more teeth by far are lost through diseased conditions of the gingival and the pericemental membrane, if the operator is to be successful or most successful he will give that department most attention which is most prolific in the destruction of the teeth. It has been said by our learned Dr. Talbot "that if you take care of gingivitis you will have no pyorrhea." Let me add here that the term pyorrhea is not the name of a specific disease which we find destroys so many teeth, but one of the stages or phases of an inflammatory condition which begins with hyperemia at the gingival border, and ends with total destruction of the gum and its attachment, the alveolar process and pericemental attachment and the loss of the tooth itself. Just as suppuration is a part of the phenomenon we call inflammation (as is also the earliest hyperemia) so is pyorrhea (or the flowing of pus) a phase of the inflammatory action which destroys the teeth.

Then to return to the quotation of Dr. Talbot, stop the hyperemia and you avoid the suppuration; or, as he gives it, "stop the gingivitis and you have no pyorrhea." Or to put it more simply still, stop the condition at the beginning and you have no progression. Is it not true of all things? It is the proverbial "stitch in time."

With scarcely an exception these cases or this class of cases beginning at the gingival are the direct result of neglect. Why is it that the mouth, which should be virtually the cleanest part of our whole anatomy, is in reality the filthiest? It is only from

the fact that it is most neglected even in this present day of advanced systems of hygiene. We strain at gnats and swallow camels.

The phenomenon is as follows: Mucous patches or accumulations upon the teeth, in various stages of decomposition and infection, irritate the gums at their margins. These become hyperemic. A gingivitis results, progressive in its nature, with a continuation of the causes of its irritation. Exfoliation of gum tissue, hypertrophy, follows. Congestion of the vessels of this tissue and exudations are the result of continued irritation, which like the condition itself is progressive. With a profound congestion of the hypertrophied gums, the blood almost bursting through the surface, there naturally results a decomposition of this excess of blood, a decided acid reaction in its generation, calcareous in its nature, with the formation of the calcium and sodium urates.

These and other irritating salts are deposited within and upon the gums and pericementum. Soon the loss of function adds its share to the destructive process and absorption of gum tissue, alveolar process and pericementum, or probably a wasting away of these, leaves the teeth loose, without support, and withal so irritated and painful that relief is had in their falling out or in extraction. These changes are the direct result of a lack of oral hygiene and are the usual pathologic changes we might look for from such cause.

There are also certain traumatic causes which are apt to induce similar conditions, locally but rarely general. The common causes are use of arsenical agents for devitalization; the passage into the apical space of an irritating drug used in medication; forcing of root filling materials of various kinds through the apical foramen; pieces of root reamers or drills or broaches used carelessly in canals; drilling through the lateral aspect of a root; very rapid wedging for spacing, or tooth movement in regulating cases; ligatures or clamps injudiciously applied or retained; too heavy or excessive malleting in building up large gold fillings; or the biting of too hard substances, as nuts, pieces of ice, threads and other things. Blows and falls affecting particular teeth are apt to cause acute pericementitis. The acute form arising from any of the foregoing causes is usually of short dura-

tion, depending upon the vitality of the patient and power to resist or offset this condition. Usually surgical rest of the tooth or teeth affected is indicated, with local application of tincture of iodin as a counter-irritant or the use of the following for the same purpose:

℞ Tincturæ aconiti (rad).....fl. ℥ i
Chloroformi .....fl. ℥ iv
Menthol.....gr. xx.—M.

Sig.—Dry gum and apply freely.

This has been found by the writer better than tincture of iodin. Capsicum in its various forms of preparation, hot applications of extract hamamelis have also been successfully used for this form of pericementitis.

The important part of this paper will be that portion which dwells upon the treatment of that class of cases which have their origin at the gingival border. Let me begin with an incipient form or almost what precedes an incipient form of gingivitis. Before the gum margin is affected there must first be an accumulation upon the tooth surface of a mucous-like accretion, which within a very short time after its accumulation, or in fact simultaneous with its accumulation, becomes infected with disease organisms. These infest the mass of accumulated mucus and soon its decomposition takes place as it lies upon the tooth-surface at the cervical margin and in contact with the gum.

This is the very first, the beginning of a phenomenon which starts with a gingivitis and ends with the loss of the tooth, wherever remedial measures are wanting. At this time the remedy will be frequent brushing and the use of an antiseptic wash. Listerine, glyco-thymoline, mild solution of zinc, sodium, or camphor phenate, or any form of the astringent and antiseptic solutions, with many of which we are not all familiar.

As the disease progresses from its being neglected, more stringent measures will be necessary to overcome it. When congestion of blood with partial decomposition, and hypertrophy of gum tissue exist, laceration for depleting the gums of the excess of blood and scaling of the tooth surfaces and careful examination of all cervical borders to discover if possible any accretion of calcareous matter beneath the gum margin, must be thoroughly

done. There is usually in gingivitis a collection of greenish black calculus, circling the neck of the tooth just under the gum margin. You will be surprised to find how often this occurs. Mechanical removal is first indicated, followed by an application of Veo's remedy (which consists largely of trichloracetic acid), or the application of the acid itself, applied with the aid of a thin, long-pointed orangewood stick and passed as far as possible under the free gum margin, even at the expense of detaching slightly the gum from the tooth. This must be followed by the careful and vigorous brushing three times a day by the patient, whose thought and interest should be aroused to the necessity for careful and constant attention to prevent a certain progress of the disease if it is neglected.

A little farther on in the progress of this disease, we meet a condition where the gums are engorged with blood, exfoliation and hypertrophy of gum tissue is seen; they are sensitive and bleed at the gentlest brushing; the tooth surfaces are sensitive, especially close to the gum margins; the gums are full, loose and almost flabby in the interspaces, and often for a considerable distance are unattached. These loose flaps may be lifted up or away from the teeth and beneath is found a collar or ridge of calcareous deposit of considerable thickness and very hard, dark in color, and which is with considerable difficulty detached from the tooth surface, which has reached practically up to the pericementum. In other words, it has reached the cervical portion of this membrane.

A pericementitis is associated with a profound gingivitis. The effect upon the membrane is such as to produce disease of a greater part of the organ and soreness upon biting, pain upon percussion, partial looseness of the tooth or teeth in such stage, for it has spread to some extent and may now involve any number of the adjoining teeth. The treatment will be more difficult with the further progress of the disease. Pockets have begun to form beneath the gum margin, showing that it has affected much more of the pericementum, also the alveolar process, causing atrophy of these tissues, and in the spaces and depressions thus formed the debris of the mouth finds lodgment. Infection is now rampant! The disease from a dental standpoint is dan-

gerous and malignant. Tissues and organs are being rapidly destroyed. The treatment now becomes even more radical. The destructive process must be checked. Nature can no longer keep pace with the destruction of tissue. Science and mechanical skill are brought into play and by curetting and laceration we remove all diseased tissue. The scaling of calcareous matter must be most thoroughly done. Instruments for this purpose must be so shaped that every portion and angle may be reached. The process of scaling in this stage becomes very tedius and trying. But "Eternal vigilance is the price of success." Every particle must come off and the tooth surface be thoroughly polished afterward. The deposit is of a serumal character, being without doubt a calcareous degeneration of the blood. It is a violent irritant to the soft tissues and must be removed and its further accumulation prevented. The pericementum, too, is in such a state of inflammation and degeneration that it is being rapidly destroyed. The teeth now affected become loose, long and sore, and necessarily lose their function. All the tissues show less resistive powers and succumb to the pathologic condition. We get rid of the great excess of blood in the scaling process and in place of a great quantity of degenerating blood which has lost its nutritive power and become even a source of irritation from loss of its oxygen and also its alkalinity, we have a normal quantity of new life-giving blood and the sensation is one of stimulation.

Following the scaling, astringent and stimulating remedies are applies freely to the soft tisues, and a healthy reaction soon sets in; and when the treatment is repeated a number of times associated with proper hygienic and prophylactic measures the results are astonishing and gratifying.

For astringent action we use tincture of iodin, and also a mixture of equal parts of tinctures of aconite and iodin; solution of quercus alba (white oak bark) for the physiologic action of the tannin; and the aforementioned zinc phenate solution. For stimulation, solutions of five per cent phenol; also a solution of equal parts gum camphor, phenol, oil wintergreen and water, carefully mixed and used as a massaging solution. This last preparation is very beneficial and interesting. Camphor is a decided stimulant, a cardiac stimulant, and no doubt has similar effect upon

the vessels themselves, in local application, elevating the arterial tension. Phenol and gaultheria, while they are homologous, have somewhat different effects, or distinctive effects. Both are classed with the antiseptics, and, properly speaking, belong there, but we find that phenol is stimulating to a considerable extent, and gaultheria, while antiseptic, acts as an obtundant and analgesic, both this and phenol as well as thymol producing a paralysis of the end organs of the sensory nerves.

To get the best effects of this combination it should be accompanied with massaging of the gums for five or ten minutes at each sitting for the treatment. The results will be evident in the return of the normal color to the gums, a light rose pink, in place of red or the purple of congestion, and a feeling of stimulation, of returning vitality and strength to the tissues of the mouth and teeth. The treatment for this insidious disease must be continued with inexhaustible patience and determination to check it. The effects of successful treatment are a transformation and a revelation, are always gratifying and of incalculable value to the patient who will have retained the natural organs of mastication and a condition of health, for this reason, far better than he would otherwise enjoy; an appearance of the mouth and teeth which is inviting and attractive, instead of repulsive and offensive. The operator will have been a benefactor to the race, "having made two blades of grass grow where only one grew before," in his having recovered from loss these organs, the well-being of which is so dear to every conscientious dentist and so necessary to the health and comfort of us all.—*Items of Interest.*

ORTHODONTIA IN RELATION TO THE DEVELOPMENT OF THE BONES OF THE FACE. By Frederick C. Kemple, D.D.S., New York City. Within the past decade much light has been thrown on the internal anatomy of the head and face, by which we have been able not only to gain a far better knowledge of the arrangement of the various parts, but also to study the physiologic and pathologic relations of its different structures.

The fact that well rounded, fully developed dental arches are almost invariably accompanied by well developed nasal spaces,

well developed ethmoid, sphenoid and maxillary bones, we have learned, is not a simple coincidence, but the result of a relationship among the different structural parts of the face which is so intimate that the developmental influence of one part must affect to a greater or less degree the development of every other part.

Per contra, if the development of any part of the face be arrested, or if deformity occur early in life, the result will be a more or less abnormal or deformed development of every other part. Because of this far-reaching influence, the operator in caring for the teeth of his little patients should be eternally vigilant for the appearance of any aberration in the arrangement of the deciduous, or the development of the permanent denture.

The close pathologic relationship of the various structures in this region and the interdependence of some of the different organs found within this field have only of recent years been recognized. Until within the past decade or two oculists treated the eyes and otologists treated the ears as if these organs were each complete in themselves. Their physiologic relation with the nose and throat and teeth was not considered in diagnosis. Lesions of either were usually regarded as local, and received only local treatment.

In the light of present-day knowledge, however, this method of local diagnosis has practically passed away. No diagnosis is complete which does not consider the part affected in its relation to the organism as a whole. This is particularly true in the treatment of eye and ear lesions. Specialists now recognize that there is no region in the entire human anatomy where reflex disturbances are more common and, with this fact in mind, their diagnosis not infrequently begins with an examination of the teeth.

It is only necessary to examine a few of the splendid anatomic sections of the head and face made by Dr. Cryer to see the intimate relationship between the upper dental arch, the nasal spaces and the maxillary antra, and in turn see how the constriction or narrowing of the dental arch will cause a collapse of these spaces and disarrange the entire internal anatomy of the face.

In some of these specimens where the upper dental arch is much constricted, the nasal spaces are found to be almost entirely

occluded and the maxillary antra nearly obliterated. Such malformed conditions of structure are produced during the early period of growth while the bony framework is yet in a plastic or formative state. The writer believes nasal obstruction in very early life to be an important causative factor in misdirecting the forces which act in the formation of the jaw.

All young growing structures manifest great susceptibility to any constantly acting force, however slight the force in itself may be. The readiness with which the bones of the skull and face of young children yield to the lightest pressure is quite remarkable.

Ethnologists believe the kind of pillow on which an infant lies will modify the shape of the skull. A cicatrix from a burn may permanently change the shape of the facial bones. In cases where the head has become fixed to one side through disease the position of the eye and shape of the skull have been changed. Darwin has shown that such a trifling cause as the lopping forward of one of the ears of a rabbit "drags forward all the bones of the skull on that side."

Thus it is easy to see in the growth of such a complex structure as the human face how a change from the normal to the abnormal in the forces acting on its developmental growth, due to whatever cause, and however insignificant the change may appear, might result in such an abnormal anatomic arrangement of the parts as to materially interfere with their functional efficiency.

Injury to the head or face at birth, pathologic conditions of the nose or throat in early childhood, habits of thumb-sucking or lip biting, and premature loss of either deciduous or permanent teeth, are all prolific causes of this change from the normal to the abnormal in the development of the bones of the face.

The writer will add one other cause which he regards as the most important, because the most universally active—the primary cause of some of the causes enumerated above. That is the tendency of all organs to vary through change of function.

From the protameba to man, function has preceded structure. From the lowest form of life to the highest every advance made in structure seems to have been for the better adjustment of the organism to perform its functional activities. And when these activ-

ities have become changed through change of environment or mode of living, a change of structure has gradually followed.

Darwin found "in the domestic duck that the bones of the wing weigh less and the bones of the leg more in proportion to the whole skeleton than do the same bones in the wild duck," and he assumes "that this change may be safely attributed to the domestic duck flying much less and walking more than its wild parent."

It has been found, also, that the weight of the lower jaw is greater in savage than in civilized races—in about the proportion of 5 to 4—while the mean weight of the skulls examined was nearly the same. (Talbot, page 155.) May not the same conclusion be drawn here as in the case of the wild duck?

Also, many of the most eminent men of science agree that "modifications of structure caused by modifications of function are transmitted to the offspring."

This, in the writer's opinion, can be ascribed as the most potent cause for the great number of malformed, poorly developed jaws of the present civilization.

So great has been the change in the structure of the jaws of civilized man that a well developed face with the full complement of thirty-two teeth in nearly normal occlusion is so rare as to excite comment and admiration from every dentist.

Among semibarbarous or primitive tribes exactly the opposite conditions prevail. Well-developed jaws, teeth comparatively free from caries and in nearly normal occlusion are the rule, rather than the exception. These people have continued to use their jaws and teeth for the purpose of mastication, and their diet includes articles so tough as to require the most vigorous chewing. Among the Esquimaux it is a custom to chew the raw skin of the whale or seal for its blubber; the Modoc Indians are said "to munch the raw kais root all day long;" and the "Bushmen, when short of food in winter chew prepared gnu skin until their very jaws ache."

Thus you may go through the entire catalogue of primitive people and find the same vigorous chewing of tough roots, herbs, skins, etc. Note the difference between the functional activity of their organs of mastication and those of civilized man and, the writer believes, you have found the cause for the great differ-

ence in the structural development. The masticatory apparatus of civilized man is simply suffering from disuse.

The lack of development of the jaws in highly civilized races —and this applies particularly in America—is observed almost as frequently in very young children as in adults. Symptoms of abnormal development, and in some instances marked malocclusion, may appear as early as the second or third year. In the deciduous denture of five or six years this tendency toward malocclusion becomes more apparent in an increasing number of cases in which, if the growth of the jaw be not stimulated, the result will inevitably be a malocclusion of the permanent teeth, and a consequent derangement of the anatomy of the face.

In many of these cases the departure from the abnormal at this early age is so slight that only the most careful observation will detect it, or it may appear so insignificant as to receive no consideration, and yet within this inconsiderable aberration may lie hidden the forces which, through their continued action along abnormal lines, will result in a most aggravated form of malocclusion. A deformity may result which will involve the structures of the internal face to such a degree as to materially interfere with their physiologic efficiency.

It is in cases of extreme malocclusion in adult life that reflex disturbances are so common and frequently difficult of diagnosis, a condition which causes this entire field to become of peculiar interest alike to the otologist, the oculist, the rhinologist and the dentist; and the writer will venture to prophesy that the day is not far distant when consultations among these specialists, in which the opinion of the dentist will have its full weight, will be quite the common thing.

And yet many of these cases of extremely narrow upper dental arches with consequent narrowness of the nasal spaces and prominent upper incisors, which in adult life defy the best efforts of the orthodontist, were probably in their earliest stages but simple aberrations in the development of the denture, the correction of which could probably have been accomplished by very simple means, thus allowing the uninterrupted growth of the denture to continue to completion. Such treatment might only have entailed the placing of one or two teeth at eruption in their correct

positions, or the slight expanding of one or both arches as an aid in allowing the erupting teeth to assume of themselves their natural positions.

You may say these conditions are only hypothetical and do not describe specific cases. This is true, but the conditions were made general in order to cover more of the field of orthodontic work, and because the conditions named are descriptive of similar cases that come to our notice almost every day.

In the deciduous denture the lack of development in the incisive region is frequently overlooked entirely until the appearance of the permanent lower centrals which in erupting are crowded out of position for lack of space—a condition which is not infrequently brought to the attention of the dentist by the mother of the child. At the same time the lack of development in this region has probably been directly indicated for a period of two or three years prior to the eruption of these teeth.

In every case where interstitial spacing between the deciduous centrals, laterals, cuspids, and first molars fails to appear, malocclusion of their permanent successors must inevitably result.

In jaws which seem to have a normal development the spacing of these teeth is usually well marked as early as the fourth year.

The combined width of these spaces should amount, approximately, to the difference between the combined widths of the six anterior deciduous teeth and the combined width of their six permanent successors—thus allowing sufficient room for the permanent teeth to erupt in normal order and position.

When nature fails in this development, the writer believes it to be the duty of the dentist to give his assistance as soon as the symptoms indicate such need.

By very simple means it is possible to stimulate growth in the incisive region at an early age, and by this growth probably abort a deformity which, if allowed to mature, would require months of treatment for its correction.

The same may be said of many of those which are characterized by the receding chin and apparently excessive protrusion of the upper incisors. Symptoms heralding this condition appear in many deciduous dentures, and the early treatment of these

cases becomes very simple when compared with the treatment required after the eruption of the permanent teeth.

In deciding at what age to treat irregularities of the teeth, this fact should be kept in mind: By early treatment we are assisting nature in overcoming some of the obstacles which interfere with orderly eruption, and with these obstacles out of the way the teeth establish themselves in their proper positions through the natural process of growth. By later treatment, *i. e.,* after the permanent teeth are fully erupted, the operation becomes one of reconstruction; we compel a resorption of tissue and nature must do her work a second time.

It is a grievous error to regard any case of malocclusion as self-corrective. Occlusion always implies a contact of the upper and lower teeth. If, when the upper and lower teeth are in contact, some of their inclined planes become engaged in an abnormal relation, it is impossible for nature to overcome this locking process. Nature will do her full duty in development along proper lines if she be not too heavily handicapped, but when she is obstructed in her orderly course she simply does the best she can under the circumstances.

As often observed, teeth in process of eruption present a very irregular appearance, but upon careful examination they are found to occupy their correct positions in relation to their antagonists of the opposite jaw. In such cases the malpositions of the teeth are more apparent than real. As the development of the denture proceeds, the inclined planes become properly engaged, and through their influence the apparent irregularity of the teeth disappears. It is only under these conditions that an irregularity is self-corrective, and distinction should be made between such an irregularity and malocclusion. Where malocclusion really exists the deformity is increased and correction made more difficult with the eruption of each succeeding tooth. The forces at work being misdirected by the improper locking of the cusps, the influence of the inclined planes and the eruptive force of the teeth tend toward further deformity as the denture approaches completion.

It is for the purpose of gaining the assistance of the inclined planes and the eruptive force that the writer urges early treatment wherever it be possible. Guide the teeth to their correct

positions in the arch during the eruptive period, rather than drag them through the alveolar process after they have become established in their improper positions.

It would be better still, if before the appearance of the permanent teeth sufficient development of the jaws can be induced to allow their orderly eruption without any interference on the part of the dentist. By either of these methods a denture is established practically through the process of natural growth, one that approaches the normal as nearly as the tooth forms of the individual case will permit.

Development as described may often be stimulated through a very gradual expansion of the lower arch before the loss of any of the deciduous teeth, the expansion being produced so slowly that the enlargement of the upper arch follows through the force of occlusion, the little patient suffering no pain and little if any inconvenience.

Such treatment is prophylactic—it is prevention rather than cure—and is entirely in accord with the accepted principles of orthopedic surgery.

In this connection, the importance of preserving the deciduous teeth till such time as their successors appear cannot be too earnestly urged. Thus many of the deformities of the jaws and face with which we have to contend might be aborted by judicious early treatment.

The age at which the natural growth of the jaws is complete probably varies within a wide range, but the fact that nature unassisted has been unable to assert her mastery in the correction of many of the deformities, due probably to nasal obstruction, after the age of seven or eight years, has given rise to the impression that the growth of these parts is nearly complete at an early age. Kyle, in his "Diseases of the Nose and Throat," says: "The worst feature of these developmental deformities is, that unless perfect nasal respiration is established *early in life—i. e.,* before the fifth or sixth year, or not later than the seventh—the bony and cartilaginous framework becomes so firm that little can be done toward increasing the nasal space for breathing, and the individual will, of necessity, be a mouth-breather for life."

The writer believes in those cases of nasal obstruction where

mouth-breathing has continued for sufficient length of time to produce a narrowing of the dental arch and collapse of the nasal space, that the nasal space fails to develop after the rhinologist has completed his work, not because the "bony framework is too firm" to permit development, but because at the age of six or seven years the cusps of the teeth have become locked in this cramped position and nature cannot release herself from the influence of their inclined planes. The fact that development of these parts immediately follows the release of the teeth from their cramped positions would indicate that growth here had not ceased, but had been checked by forces acting abnormally.

Unfortunately, we have no means of measuring, or even observing the changes which take place in the internal face following orthodontic treatment, but that internal changes do occur and subsequent development of the parts result is evidenced by every successful operation.

The widening of the alveolar arch in the molar and bicuspid region will sometimes, in extreme cases, amount to a full half inch, and in such extreme cases the entire contour of the external face becomes much changed. In many cases where the efforts of the rhinologist have failed to relieve the mouth-breathing, relief has followed orthodontic treatment, not only at the age of six or seven, but as late as the fourteenth or fifteenth year. In many cases where considerable movement is required in order to place the crowns of the teeth in their proper relation, the teeth immediately following such treatment stand at a decided angle, so much so that the buccal cusps of the molars and bicuspids are frequently not in contact, and in this position can be of practically no service for mastication, but if the teeth be properly retained their roots gradually assume their nearly vertical direction, and within a year or two the buccal cusps are once more in occlusion and ready for better service than ever before.—*Items of Interest.*

NITROUS OXID AND OXYGEN; ITS POSSIBILITIES AND PRACTICABILITY AS A GENERAL ANESTHETIC. By C. K. Teter, D.D.S., Cleveland, Ohio. Nitrous oxid and oxygen as an anesthetic was brought before the profession by Dr. E. Andrews of Chicago in 1868, and it has taken the most of us

all the years since to realize the fact that in this combination we have an anesthetic that meets the requirements of the dental surgeon more completely than any other. There can be no question that it is in a class by itself in regard to its safety and its freedom from after-effects.

This is an old subject, though I am sorry to say that both the medical and the dental professions are, in the main, to a large extent ignorant of the possibilities, practicability, limitations, and proper mode of administration of nitrous oxid and oxygen. It is a matter of surprise and chagrin that we find in our leading dental journals such statements as this: "Nitrous oxid, without a doubt, is the safest anesthetic for the dentist to use, but inasmuch as the available narcosis is so short that it restricts materially its general application, therefore it is advantageous for us to use some other agent which, though not so safe, will give us a longer period of available anesthesia." Such statements have no ground in fact, for we are able with nitrous oxid and oxygen to obtain longer anesthesia without interruption, for work in the mouth and throat, than is possible with other anesthetic agents, except chloroform.

It is astonishing that it takes the profession so long to realize what is being accomplished in its own ranks. While there have been papers read and clinics given for the past four or five years before our local, state, and national societies demonstrating this anesthetic, still such statements as that just quoted, which occasionally make their appearance in our journals, written, as a rule, by men who have had our confidence, cause us to hesitate in classing their authors among our most enlightened and progressive dentists.

My experience in meeting and talking to medical men as well as to dental has been that the average practitioner knows very little about anesthetics, and less about their proper administration. Sir Frederick Treves stated a truth when he said, "There is a widespread impression that to give chloroform is a minor act—that the power comes with the granting of the diploma, and the significance of the procedure is sometimes emphasized by the remark, 'Well, if a man cannot give chloroform, what can he do?' This is a branch of our profession that is sadly neglected, for

from a great many of our schools men are sent out year after year absolutely ignorant of the elementary principles of anesthetic administration. This condition is true not only of schools of our own country but of the schools of Europe as well."

To my mind this subject is of more importance than any other. If the student ever contemplates administering anesthetics at all, owing to the fact that a precious human life is intrusted to his care during every administration, anesthesia should certainly receive far more attention in the college curriculum than it does now. It is impossible to suppose that all medical and dental men can be educated to that plane of excellence which would make each of them a skilled anesthetist, but all should attain sufficient knowledge to fit them to estimate their own capabilities, and to know when a given case is difficult or dangerous. Above all, they should know the limitations of the agent in hand, and be able to recognize symptoms of danger and know what to do to overcome them.

When we come to the place where we recognize that each patient has his individual peculiarities, susceptibilities, risk, and after-danger, we shall be in position to go on and improve, and to have a proper appreciation of this great subject and thereby become worthy of the confidence placed in us.

It must be remembered that much of the risk involved in administering any of the anesthetics depends greatly upon the skill and experience of the administrator, and by losing sight of this fact a comparatively safe anesthetic may become a dangerous one.

Nitrous Oxid and Oxygen.—In taking up the physiologic action and effect of nitrous oxid and oxygen I wish to state at this time, so that there will be no misunderstanding, that there is no true anesthetic effect derived from the oxygen; oxygen in itself will cause a certain amount of analgesia, but it is not an anesthetic.

Nitrous oxid enters loosely into combination with the hemoglobin in the red corpuscles, partly replacing the oxygen and normal gases of the blood, and is carried throughout the entire system. It is not only an anesthetic but is an asphyxiant as well. If we can remove the latter quality we have an ideal anesthetic agent, as nitrous oxid is practically non-toxic, and there is no

other agent known that is capable of producing narcosis with so little constitutional disturbance. The physical properties of nitrous oxid are such that the delicate nerve cells do not undergo any decomposition, nor do they lose any of their function or integrity after the complete elimination of the agent has taken place. Nitrous oxid has a specific action upon the nerve cells, which temporarily impairs their functional integrity. In order to bring about this condition it is necessary that this agent be administered in an almost pure state, otherwise the amount of free nitrous oxid in combination with the hemoglobin would not be sufficient to produce this effect in its entirety, but the nerve centers would be stimulated, and we would have increased activity throughout the entire system, with more or less muscular movement and mental disturbance.

During the initial stage of its administration nitrous oxid causes the phenomena above described, but as this aroused activity causes an increased depth of respiration, the tidal air in the lungs may be increased to three or three and one-half times the normal amount, thus greatly increasing the diffusion of the agent. This diffusion causes absorption to take place very rapidly, so that we soon have that degree of saturation which is necessary to bring about complete surgical anesthesia. If undiluted gas has been given up to this stage, we will not only have the symptoms of narcosis present but the phenomena of asphyxia will be alarmingly manifested, indicating an extreme condition of anoxemia. This condition of anoxemia is not essential in bringing about anesthesia with nitrous oxid. It is possible in the majority of cases to produce a profound surgical narcosis with complete relaxation of the muscular system without this asphyxial element entering into the procedure at all. By administering pure oxygen continuously with the nitrous oxid we can supply the organism with sufficient oxygen to carry on oxidation so that the vital functions are not impaired, and still have a sufficient saturation of the system with nitrous oxid so that the function of the other nerve centers will be impaired. The percentage of oxygen which will be required in maintaining a proper equilibrium between the introduction and elimination of the nitrous oxid will vary greatly, according to each individual's temperament

and peculiarities. But speaking generally, about twelve per cent of oxygen will be necessary for a continued administration. I have had cases, to which I shall refer in detail farther on, in which I was able to administer as much as twenty-five parts of oxygen with the nitrous oxid, and was able to maintain surgical anesthesia in the truest sense of the word.

Nitrous Oxid With and Without Oxygen. It is interesting as well as instructive to observe the effect of nitrous oxid and oxygen upon the brain, and to note the difference when nitrous oxid is administered with and without oxygen. When the nitrous oxid is administered alone we find that as soon as the asphyxial element begins to enter into the procedure, the brain loses its natural pinkish color and turns more or less gradually to a dark purple. If the administration be continued without air or oxygen, it will take on an appearance resembling that of stagnant blood. As this discoloration progresses there is a dilatation of the brain, and the greater the discoloration the greater the dilatation, so that it will protrude through an opening in the skull. One can imagine what this would mean to a patient with a myasthenic heart, or one with apoplectic tendency. This accounts for the headache complained of sometimes after the administration of an anesthetic. The condition of the brain is altogether different when a patient is anesthetized with oxygen in combination with the nitrous oxid. I speak from actual observation, as it has been my good fortune to observe the brain while the patient was under the influence of this mixture. The following will illustrate the point I wish to emphasize.

A Case in Practice.—A lad ten years of age was playing on a fence and in some manner fell off, landing on his head. The bruise was near the junction of the occipital and parietal bones on the left side, causing an epidural hemorrhage. The pupil of the right eye was extensively dilated and the muscles of the same eye were paralyzed from the pressure on these centers within the brain. There was not even a scalp wound from the fall, but he became unconscious almost immediately, and remained in that condition for about twelve hours before an operation was decided upon. His condition was very grave, and little encouragement was given as to his recovery. Nitrous oxid and oxygen

was decided upon as the safest anesthetic to give in this case. I started the administration with about eight parts of oxygen with the nitrous oxid, increasing it to twelve parts within the first minute, and was able to obtain complete relaxation in about fifty-five seconds, the pulse, which had been exceedingly rapid and almost imperceptible, becoming full and strong. The face, which was very pale at the commencement of the administration, took on a good color. Respiration became more rhythmical and the patient was actually in better condition than he was before the administration commenced. There was no noticeable dilatation of the left pupil at any time, and the conjunctival and corneal reflexes were soon abolished, the patient passing into a deep and quiet sleep. Then an opening was made in the skull, and by delicate manipulation the brain was moved to one side and a large quantity of clotted blood removed.

This operation gave me a long-wished-for opportunity to observe the human brain under anesthesia, and to notice the effects of nitrous oxid and oxygen upon it. I made the following observations:

On increasing the oxygen slightly for about five seconds, I noticed a quick change in color and a perceptible dilatation of the brain. This was not carried very far, owing to the probable injurious effect of such a procedure. On increasing the oxygen to almost one-half of the mixture, it was but a few seconds, not more than nine or ten, until the brain assumed its natural color and returned to its normal position. The rapidity of the action was a revelation to me, and called forth some expressions of surprise from the attending surgeons.

I can say without reserve that the dilatation and congestion here noticed were not due in the least to the anesthetic action of the nitrous oxid, but the condition was entirely an asphyxial manifestation. Of course the asphyxial factor may be present, no matter what may be the anesthetic agent used, if there be much restriction of or interference with the natural processes of oxidation; therefore the argument for a non-asphyxial method of narcosis.

The recovery of this patient was wonderful. The surgeons did not expect that he would regain consciousness for at least six

or seven hours, but to their surprise he became conscious two hours after the operation and made very rapid recovery, regaining all of his faculties and usual vivacity.

Skill in Administration.—There are a great many things that can be said in favor of this combination as an anesthetic, and the possibilities are practically unlimited in the hands of one skilled in its administration. Without a doubt it takes more skill to administer this combination properly than it does for some of the other agents that are used for inducing anesthesia; but are we to allow this fact to deter us from using it and employing something we know to be more dangerous? It is essential for every dental operator to possess a certain amount of skill if he wishes to insert a good gold filling, or to construct a nice denture, or to make a serviceable piece of bridgework. But in order to possess this kind of skill it is essential that he should have had the proper instruction in this particular line of work, and to have given it a great deal of study and practical application. We would not ask a blacksmith to fix a watch; nor do we expect a carpenter to be skilled in wiping a lead-pipe joint; but we do expect a plumber to be skilled enough to do the latter. Considering that even these things demand special training, I hope we will not hear any objection to the use of this anesthetic because it incidentally requires considerable skill in its administration.

When we consider the few fatalities—only about thirty-five—that have occurred under nitrous oxid during the last half-century, and when we take into consideration the fact that a great many of the men who are using it know little or nothing about the administration of anesthetics, or how to prepare the individual for a general anesthetic, it is simply marvelous! Now that we have a practical method for making this agent continuously respirable, the possibilities are great to contemplate!

I wish to express this opinion: No matter what may be the abnormal or pathologic conditions present, nitrous oxid and oxygen can be given, if administered by one skilled in its administration, with less risk to life than any other general or local anesthetic now known. I do not mean to say by this that this anesthetic is indicated in all cases, for it may be next to im-

possible to obtain true surgical anesthesia in some cases where it would be imperative, but leaving the operation and resulting shock out of the question, the above opinion I truly believe to be correct.

Cases Illustrating Duration of Anesthesia. As to the length of time we could safely maintain anesthesia with the combined gases, I would say that this will depend upon the physical condition of the patient to be operated upon and the nature of the operation. But in so far as the nitrous oxid and oxygen is concerned, it is respirable for a greater length of time than any other general anesthetic.

I had a case a few weeks ago which I think will be of interest because it presents the longest time any person has ever been kept in complete narcosis under nitrous oxid and oxygen for a surgical operation. The patient was a lady thirty-three years of age. Nitrous oxid and oxygen was indicated in this case, owing to some valvular lesion. The patient was large, obese, and of plethoric nature. The operation was the curetting of the uterus, followed by an extensive laparotomy, in which a great many adhesions were encountered, necessitating a tedious dissection. Not being susceptible to the anesthetic, she was a hard subject to anesthetize, as it required about five minutes to obtain surgical anesthesia. Nitrous oxid alone was given for the first few inhalations, and then three per cent of oxygen was admitted. This amount was gradually increased until eight per cent was being given. The patient became unconscious in about seventy seconds, but muscular reflexes were quite active for about three minutes. There was some cyanosis present, but I was able to overcome this after the patient had been under the anesthetic about seven minutes, after which perfect anesthesia was maintained to the completion of the operation. This patient was under the influence of nitrous oxid and oxygen, without one breath of air, for two hours and forty-eight minutes. Nearly six hundred gallons of nitrous oxid and eighty gallons of oxygen were used. Upon the completion of the operation the anesthetic was withdrawn, and the patient regained all of her mental faculties within one minute. There was very little shock from the

procedure. Nausea and other post-anesthetic complications were entirely absent, the patient making a speedy recovery.

The next longest case I had was for an extensive laparotomy. The patient was in such poor physical condition that the surgeons all agreed she would never have lived through the procedure under any other anesthetic. It was necessary in this case to maintain complete surgical anesthesia for two hours and thirty-five minutes. Upon the removal of the anesthetic she regained consciousness in about five minutes. The patient's slowness to revive was due to her extremely low vitality. There was no nausea and she made a slow but uneventful recovery. The small amount of surgical shock in this case can only be accounted for by the stimulating effect of the oxygen, and also that of the nitrous oxid when the element of asphyxiation is eliminated.

The cases in which we meet our most wonderful successes are those where grave inroads have been made upon the general health from wasting diseases, abnormal growths, degenerate changes, etc. For this class of cases nitrous oxid and oxygen is the anesthetic *par excellence,* and leaves nothing more to be desired.

More Cases in Practice.—Having had nearly six hundred cases in which nitrous oxid and oxygen was used in major operations, I have met quite a few which were very interesting, and also quite a number where the results were marvelous. I will refer to only a few of them here.

Case 218.—Ruth S., age six years, had been sick with scarlet fever for six weeks and was in a very precarious condition. Systemic abscesses had developed and a mastoid operation was necessary. Owing to her extremely low vitality, the anesthetic was the chief source of worry and apprehension to the physicians. I administered nitrous oxid and oxygen and induced complete surgical anesthesia in three minutes. Respiration was quite rapid and the pulse exceedingly so, being about 160; this was much reduced during the narcosis, and became bounding and of good tension. The operation was completed in about twenty-five minutes, and upon the removal of the inhaler the child regained consciousness in a little less than three minutes. One half-hour

after the operation the pulse was again taken, and was found to be in excellent condition.

Case 212.—Mrs. P., age sixty years, was operated on for empyema of the lungs. This patient had been given up as having no chance for recovery. She had been bedridden for about two years, being at this time a mere shadow of her former self, and her vitality very low. Anesthesia was induced in about three or four minutes by using from eight to twelve parts of oxygen from the beginning and increasing this amount greatly, so hat I was using about fifteen parts of oxygen when the operation was commenced. I did not produce deep narcosis in this case, as it was not deemed advisable, nor was it necessary. At the completion of the operation I was administering about twenty parts of oxygen with the nitrous oxid, and still was able not only to keep my patient in the unconscious state, but also free from muscular movement as well. The operation was completed in forty minutes and recovery from the anesthesia took place in about one minute. The patient retched a few times during the first five minutes. After the operation she expressed herself as feeling better than she did before it.

Case 241.—A baby boy whose birth was induced at the eighth month—being at this time three months old—was operated upon for the purpose of closing a false opening between the urethra and scrotum; circumcision was also performed at the same time. I used no inhaler at all for this case, but instead forced the nitrous oxid and oxygen through the tube, holding it in front of the nose and mouth. Narcosis was soon induced with a mixture of about five parts oxygen from the cylinder and ninety-five parts nitrous oxid. There was a certain amount of adulteration caused by the non-exclusion of the air, but notwithstanding this it was soon necessary to increase the percentage of oxygen in order to prevent cyanosis. Perfect anesthesia was maintained for thirty minutes to the completion of the operation, and upon the withdrawal of this attenuated vapor, recovery took place within thirty seconds. The child seemed as bright as ever, and the sympathetic mother, in her anxiety, put the child to her breast at once and it nursed without any ill effects.

Case 197.—A little girl three years of age was presented

for an operation for the removal of pus from the pleural cavity. She was very much emaciated and presented an anemic, cyanotic condition, due to empyema of the lungs—a sequence of pneumonia. There was a continual rattling cough which materially interfered with respiration, and which made this case extremely difficult and hazardous. We found a very weak, rapid-running pulse, almost imperceptible. I consumed about four minutes in producing anesthesia, using a very large per cent of oxygen. It was possible in this case to maintain tranquil anesthesia with as much as twenty-five parts of oxygen with the nitrous oxid, and the child's condition was actually improved during the anesthesia. The operation was successful and the ultimate recovery of the patient perfect. There was removed from this child's pleural cavity over one gallon of thin greenish-yellow pus. No nausea or sickness from the anesthetic occurred and very little shock from the operation.

There are a great many cases that I would like to give in detail, but as the time will not permit, I shall only briefly mention a few more of the most interesting.

I administered nitrous oxid and oxygen to a woman weighing 380 pounds, for an umbilical hernia, the operation requiring one hour and fifty minutes to complete.

In another case, while I had a patient under nitrous oxid and oxygen, two separate operations were going on at the same time; one surgeon removed the entire left breast and the other performed an appendicectomy.

Some General Considerations.—All these cases to which I have referred are outside of the field of dentistry, but the point I wish to emphasize is this: If that here employed be the safest and best method to use in these especially dangerous and prolonged cases, it surely is the best and safest anesthetic for the dental surgeon to use in all cases where a general anesthetic may be indicated. It will meet the requirements more fully and will be appreciated by the patients far more than would be the case were any other anesthetic used.

For operations in the mouth or throat, when the patient as a rule breathes through the mouth, this anesthetic can be administered continuously without interfering with the operation, no

matter what duration. I have been called upon to maintain complete anesthesia for operations of this kind lasting as long as one hour and twenty minutes, and it is a very frequent occurrence for me to maintain anesthesia for such work for ten or fifteen minutes, and I want to say that it does not take an expert to do so, either.

Men who have knowledge of general anesthetics say that nitrous oxid and oxygen is the safest. Yet most of them erroneously lay stress upon the shortness of the anesthesia obtained. I wish that I could for all time disabuse their minds—and yours as well—of this fallacy. The length of narcosis is at your command. One can keep his patient anesthetized to the completion of any oral operation.

I wish to impress upon you this fact, viz., that if one wants to maintain prolonged anesthesia with any anesthetic, strict attention must be paid to the diet of the patients, also see to it that they are loosely attired, or else they will experience trouble and after-sickness. All patients expecting to take a general anesthetic for any length of time should, by all means, be in a proper condition as far as the diet and bowels are concerned. For short administrations this is not so essential; but no anesthetic should ever be administered on a full stomach, owing to the danger involved from such a procedure. When the patient has had the usual preparation for a surgical operation I have met with very little nausea and vomiting, and have never had a case that gave me any trouble in overcoming.

The day is approaching when it will be absolutely necessary for us to do painless dentistry, and this leads me to say that there is another phase of this anesthetic—the analgesic stage. The employment of nitrous oxid and oxygen in the practice of humanitarian dentistry has a field far beyond the perception of the great majority of the dental profession who have not employed it in their work. Some six years ago I employed this method—the analgesic stage of nitrous oxid and oxygen—for the first time for painless preparation of cavities and the removal of pulps.

It is a mystery to me why more of the profession do not take

up this line of work. The use of this agent will prove a joy to the one who uses it as well as to those operated upon.

We cannot consider this as an agent that merely obtunds sensitive dentin, for it produces a general condition. This may be due to the direct influence of the agent upon the nerve centers, or upon their peripheral endings, or both. Nevertheless, we do know that sensitive dentin can be worked upon without great pain, while the gum and other tissue may still be sensitive. This may be accounted for from the fact of the minute peripheral nerves existing in the dentinal tubuli.

The question of safety may arise in your minds; as to that I will say that so long as the state of analgesia is maintained and the element of asphyxia is entirely removed, the life of the patient is in no danger.

Comparisons With Other General Anesthetics as to Safety.—I should like to devote some time to comparing other general anesthetics with nitrous oxid and oxygen, but knowing that I cannot dwell long on any one point of so broad a subject, I will content myself by giving you the opinion of a few experts.

Dr. W. J. McCardie says: "Regarding somnoform, it is stated that it does not offer any advantage, but that it is less safe than ethyl chlorid, for the reason that one of its components is ethyl bromid, and secondly, because the last few doses are liable to decompose and produce serious effects during or after the inhalation." And further: "Discussing the applicability of ethyl chlorid to dental practice the author emphasizes what he has stated in previous communications, namely, that this anesthetic should not be used in dental practice if suitable anesthesia can be obtained under nitrous oxid, for the reason that it is less safe, and secondly, because of the severity and frequency of such dangerous and annoying after-effects as collapse and vomiting."

Dr. J. T. Gwathmey of New York City, when closing the discussion of his paper, "A Plea for the Scientific Administration of Anesthetics," which was read in the Section on Laryngology and Otology of the American Medical Association in June, says that "Nitrous oxid and oxygen gas is unquestionably the safest anesthetic in the world; anybody studying the subject clinically and theoretically knows that."

In Dr. Bellamy Gardner's paper, which he read before the Odontological Society of Great Britain, February, 1906, we find the following opinion. He (Dr. Gardner) confirms "the prevalent expert opinion that ethyl chlorid is only second to chloroform in danger, and while its use is very attractive, the overwhelming evidence as to the practical safety of nitrous oxid and its mixture with oxygen renders experimental or routine use of anything else less reliable, excepting with the most elaborate precautions, almost criminal."

In Dr. Harper's paper, "Some Notes on Anesthetics," which appeared in the May number of the *British Dental Journal,* we find the following: "In nitrous oxid we have an old and tried anesthetic for dental purpose. Its administration is well understood; the various stages of narcotization are easy to follow in their well-ordered sequence, and no difficulty is experienced in reading the well-marked signs of complete anesthesia." Again, "For a successful administration of a drug like ethyl chlorid a skilled administrator is necessary, a suitable patient properly prepared, and sufficient time at disposal to admit of a possibly prolonged period of rest and quiet after the administration—a combination of factors seldom present in everyday dental practice. It is in this class of practice that the least dangerous anesthetic is the one which should commend itself most, and while nitrous oxid and oxygen are available, necessity can but seldom arise for the exhibition of a drug having the lethal possibilities which ethyl chlorid undoubtedly possesses."

Dr. F. C. Eve of England has this to say of somnoform: "Somnoform, which is a mixture of ethyl chlorid, methyl chlorid and ethyl bromid, is agreed on all hands now to have no advantage over the pure ethyl chlorid. It is more expensive and more dangerous."

After a careful study of the subject I must say that I cannot see any material advantage over pure ethyl chlorid, and as the compound is much less stable and more expensive I should prefer the former, though I have never yet seen the need of either. I have seen some alarming results from the use of somnoform, and was not surprised when I heard of the death of Mrs. William Herbig of Illinois and Mrs. Devendorf of Grand Rapids, Mich

I will not go into detail on the composition and action of this mixture, somnoform, but hope it will be brought out more fully in the discussion which is to follow. My principal objection to somnoform lies in the fact of its exceedingly rapid action without any definite symptoms to indicate the different stages of induction. The physiologic effect of an anesthetic must not be so rapidly acquired or so intense as to interfere with the control of its effects by the administrator. The nerve centers pass so rapidly under the influence of somnoform that it is a grave problem indeed to control its effect. On this account it is almost an impossibility to continue surgical anesthesia with this method.

Therefore, in consideration of all these facts from various reliable sources and from my own experience, I am convinced that nitrous oxid and oxygen is the most practical and the safest anesthetic for the dental surgeon to use.—*Dental Cosmos.*

THE DEGENERATION OF TISSUE, WITH SPECIAL REFERENCE TO THE ORAL MUCOUS MEMBRANE. By Geo. W. Cook, D.D.S., Chicago, Ill. The term degeneration, as used in the general sense, really means a change from the higher to the lower forms of living substance. In tissue changes it means that the structure has less functional activity than it would have if in a normal or physiologic state. When there has been a chemical change in the tissues there is a true tissue degeneration, but, on the other hand, when there are deposits in the tissue cells of an abnormal quantity of the constituents of the blood, we then have a process of infiltration

In some instances both conditions may exist in the tissue cells at the same time, as is illustrated in the case of parenchymatous degeneration, in which there have been qualitative as well as quantitative changes in the tissue cells. Especially is this to be seen in the parenchyma structure containing glandular tissue substance. In such cases the stroma of the tissue is peculiarly affected by deposits of certain chemical agents that normally are absent from it.

In considering all of the factors that enter into and take an active part in tissue degeneration, it is thought that heredity plays an important rôle, so far as the structural change may be concerned.

But a discussion on this phase of the subject at this time would be quite out of place.

Glycogenic Infiltration.—It is important to bear in mind, as previously stated, that infiltration and degeneration are terms that in the majority of instances are used synonymously. One of the most common forms of cellular change, with a deposit of what is apparently a substance foreign to the normal constituents of a particular kind of tissue, is that known as glycogenic infiltration, usually spoken of as infiltration and degeneration. This tissue change can and does many times take place in almost every tissue of the body. It is called glycogenic infiltration because the glycogen is deposited by the circulating fluids of the tissue structure itself.

It will be borne in mind that glycogen is a carbohydrate-like substance which is almost constantly present in small quantities in the tissues of the body in a normal state; especially is this substance found in the muscular tissue and in nerve and epithelial structures. As it appears in the muscular fibers it seems to be changed many times to a certain form of lactic acid. If the chemical molecule of glycogen be studied it is easy to see how it is possible for such a chemical reaction to take place. The chemical formula of this substance is $C_6H_{10}O_5$. Thus it will be seen how this compound can be reduced to one of the isomers—lactic acid, paralactic acid, and sarcolactic acid. The compound of glycogen, with its many derivatives, can without a doubt be present in abnormal quantities in the mucous cells of the oral mucous membrane, and sometimes in the submucous structure of that tissue.

By investigation it has been shown that after treating the oral epithelial cells for from three to six months, glycogenic infiltration usually follows. This is most easily seen as a result of the use of some irritating chemical agent followed by the active use of a stiff toothbrush, thus bringing the border of the gum extending around the necks of the teeth into direct contact with the irritating force that is so frequently used in brushing the teeth. After the application of a solution capable of irritating the gum tissue, or after bringing some mechanical force into direct contact with the tissue—the length of time above mentioned having elapsed—this glycogenic substance can be identified by properly cleansing the tissue, removing a portion of it and placing it in a solution made up of four parts of absolute alcohol and one part of tincture of iodin. If the

glycogen present in the epithelial cells should be of sufficient quantity to be thrown off with the mucus excreted, it can be observed in this mucus by adding to the latter the above mixture. After the combination stands for a few minutes it will take on a brownish red color. The same alcohol-iodin reagent added to the tissue cells and viewed under the microscope will appear of a port-wine color.

In this connection it might be well to state that any substance that in any way influences the carbohydrates of the body also influences glycogenic activity in any or all of the tissue cells, and especially certain cellular structures containing secretory cells. After the establishment for a few days of this degenerative activity of the cells it is sometimes an easy matter, by the use of some oxidizing agent, to convert the glycogen into certain acid derivatives; and these acid derivatives can be further broken up by certain enzymotic action of the tissue cells or by certain bacteria that may come in direct contact with this substance.

There is another important point in connection with this degenerative process: It not only renders the tissues capable of a diverted activity, whereby certain acid derivatives can be acted upon by the tissues, but it leaves a field that is peculiarly predisposed to the action of pathogenic bacteria. The action of bacteria on the glycogen as it comes from the mucous membrane is not understood; but the possibilities of this action as a precursor of certain acid derivatives are of sufficient importance to render the subject worthy of a more extended investigation; especially would research be valuable with reference to the glycogen as found in the oral mucous membrane. The pathologic changes that take place in the tissue cells, and especially in that part concerned with the formation of glycogen, may be enhanced by the bacteria producing an acid change. This resultant acid acts upon the enamel of the tooth and brings about certain forms of erosion.

It is important to call attention to the fact that infiltration of tissue with abnormal quantities of a normal constituent of the body is more likely to take place in the lymphoid and mucous cells of the body than in any other tissue structure.

Hyalin Infiltration.—Hyalin infiltration is another form of degeneration that is found in certain glandular structures and tissues; but it is not so common as the one just mentioned. Hyalin degener-

ation, when present in the tissues of the oral mucous membrane, can usually be identified by means of an acid stain. This substance is sometimes deposited in the intercellular substance and sometimes in the stroma of the tissue, but more often in the former than in the latter. An interesting case demonstrating this particular feature was observed, in which there was a thickening of the gum tissue extending around the bicuspids and molars. On the removal of a portion of this gum tissue and treating it for microscopic purposes in the usual way and staining it with an acid fuchsin and picric acid it showed signs of hyalin infiltration to such a marked degree that it could not be mistaken. Epithelial cells scraped from diseased gum tissue, as just mentioned, revealed in many instances the same appearance as is given by the usual well-defined hyalin degenerated tissue. But this method, together with the evidence revealed in the loose epithelial structure of the mucous membrane, does not give such sufficient and positive proof of the presence of hyalin in the upper layer of the mucous surface as would warrant our stating its presence there to be at all constant.

Mucoid Degeneration.—The next form of degenerated epithelial structure of the oral mucous membrane—and one upon which I place considerable stress as being the most pronounced type of tissue degeneration in the mouth—is that of mucoid degeneration. This is a condition manifesting itself principally in the epithelial cells of mucoid structure. Of course it will be borne in mind that such a condition might be present in any organ or tissue containing mucous glands. The first appearance of this degenerated process is usually observed in the form of goblet cells. These cells show the presence of vacuoles and have a granular appearance. These vacuoles appear most commonly in the cytoplasma of the cell. After they have extended until a number break down into a large clear space of the cytoplasma the nucleus disintegrates and becomes granulated. These granules will in the majority of instances take a basic stain. Many times these degenerated cell tissues show almost a form of coagulation necrosis, but the process is such a slow one that the retrogressive changes of the nucleus do not show very markedly until the latter completely disintegrates and takes on a large granular appearance.

During the degenerative processes these large mucoid structures show a decided difference both in their shape and in their capability

of taking stains from those of an inflammatory condition. There we have also degeneration of these cells, but we discover it through an acid rather than through a basic stain. In the form of degeneration of epithelial structure that can so frequently be found around the necks of teeth and in the interproximal spaces the mucus of the cells becomes stringy and very tenacious. The quantity may not be so very much increased, but its chemical and physical structures are considerably changed. In the chemical manipulation of the mucous exudates there are usually two distinct substances to be extracted, one being the pseudomucin and the other paramucin. When this degenerative process takes place in any tissue there is almost always present chondroitin, the chemical reaction to produce which is as follows: $C_{15}H_{27}NSO_{17} + H_2O = H_2SO_4 + C_{15}H_{27}NO_{14}$. In looking over this chemical reaction it will be observed that when this substance (chondroitin) is present in the degenerated mucus it might give rise to a decided acid reaction.

There is another chemical compound sometimes present in the mucus that has many of the general characteristics of the substance just mentioned, and that is chondrosin. It is but slightly soluble in water, but when found in the saliva it is there as a monobasic acid, and should the mucus be alkaline it will reduce copper oxids practically in the same way as will dextrose. According to Schmeiderberg, the atomic grouping of this compound is the same as in glucoronic acid. If it were present there in the form that was suggested by this author it would yield furfurol, which can easily be oxidized into mucic acid. It was found in the saliva in two cases in which glucoronic acid was present, as shown by the orcin test. There was considerable degeneration of the epithelial cells in both of these mouths, and erosion had extended to a frightful extent on the six anterior teeth. All sorts of mouth-washes had been used, of course with the usual persistent brushing. In these cases there was a distinctive mucous degeneration of the epithelial cells of the mucous membrane overlying the teeth affected by the erosion. Even the submucous structure had undergone degeneration. It was also observed that in those cases where strong astringents were used on the mucous membrane the mucous follicles usually became so contracted that they would hold the mucin in the cell for a sufficient amount of time to cause a chemical change in the mucin itself. This phase of the subject, to my mind, is of

vast importance to those prescribing astringent antiseptic solutions for various forms of changes in the mucous epithelial cells.

We have previously mentioned one of the most important phases of oral pathology—the inherited tendencies that appear in the mucous membrane of different individuals. We know that some astringent agents might be used in some mouths for years without any deleterious effects resulting therefrom, while in other mouths they would show pathologic changes in a few months. I have elsewhere shown that many of these mouth-washes arrest the action of the digestive ferments of the body. I believe that a good test for a mouth-wash, if one is to be prescribed at all, is to find out whether it retards the action of these ferments on their respective foodstuffs, because it is my firm opinion that an agent that will stop the action of ptyalin on starch will bring about some cellular changes in the epithelial structure that will be more or less detrimental to its true physiologic function.

Colloid Degeneration.—In the discussion of this phase of cellular degeneration I have only touched upon some of the fundamental processes that take place in tissue degeneration, and I am not sure as to just how I can differentiate between colloid tissue degeneration and mucoid tissue degeneration. This phase of pathology has been an interesting field for investigation to many authors, not only in connection with the mucous membrane of the mouth, but with other tissues as well. Mucin and colloids are by no means easily separated from each other. In colloid as well as in mucoid substances we have proteid-like bodies that are difficult to differentiate from each other. In colloid degeneration there is more of a glue-like structure that remains in the tissue cells for a much longer time than in the case of mucoid degeneration. In the mucoid degeneration the substance is thrown out in accordance with certain phenomena peculiar to the structure, while the colloids will remain for an indefinite period bound up in the cells, and the degeneration may progress slowly, with a decided change in the nucleinic substance of the cells. The physical difference in the composition of the two is that mucus swells up when placed in water, while the colloids are but little changed. The colloids act more like the pseudomucins and assume a characteristic very much like gelatin.

Mucin is precipitated by alcohol and acetic acid, while colloids are not affected by either of these agents. Colloids act in many

respects identically as albumin. They can exist as an acid or alkali, forming a salt that is capable of dissociation. They will exist as an acid or alkali in a gelatinous mass. During the existence of the gelatinous condition it is possible for them to change backward and forward, forming first an acid and then an alkali, and again an acid, and so on for a considerable time. Hardy and many other investigators have shown how it is possible for these cells to take up a certain amount of inorganic salts and hold them in combination for a certain period, and then throw them out again into the saliva or any of the mucoid substances. The so-called gelatinous plaques—first mentioned by Black—according to my observations are a colloid-like substance. They can gather bacteria into their folds and so these become attached to the teeth and there remain, while they are subjected by osmosis to all the influence of the various constituents of the saliva. Here they draw their foodstuff and here produce all the physiologic changes that bacterial life is competent to perform in these gelatinous sacs without being disturbed by the surrounding conditions.

I have been able in a few instances to precipitate colloidal substances from the saliva. I have then placed extracted teeth in the solution, to find that in a short time the substances would become attached to the surfaces of the teeth in such a way that it was almost impossible to remove them. These colloidal substances really have a special affinity for tooth structure. I have also suspended bacteria in these colloidal sacs and tried to act upon them with various antiseptic agents, but up to the present time I have failed with all except potassium iodid. This agent seems to be able to permeate colloidal walls and to destroy bacteria that are inhabiting them.

Closing Observations.—Degeneration of tissue in the oral mucous membrane is a pathologic process that has a fundamental bearing on all the changes that take place in the oral cavity. This process can be established by physical and chemical means. There are no agents, according to my present understanding, that have a more deleterious influence on the mucous membrane than those agents that cause astringency of the mucous follicles or those that produce over-stimulation of the cells in the vicinity of the mucous membrane surrounding the necks of teeth.

A solvent for colloidal or mucous substance in the oral cavity is another phase of the subject that will require investigation and

study. Benzoic, salicylic or boric acid, when used in mouth-washes, should be incorporated in some form of alcohol; otherwise the tissues, when subjected to their use for a considerable length of time, will become the seat of certain pathologic lesions that will act upon the tooth structure and on the normal mucous cells in the vicinity. In the presence of mucoid degeneration of the epithelial structure it is positively sure that destructive changes of tooth substance will ensue.—*Dental Cosmos.*

A BRIEF REVIEW OF THE CHEMISTRY OF PULP DECOMPOSITION, WITH A RATIONAL TREATMENT FOR THIS CONDITION AND ITS SEQUELÆ. By J. P. Buckley, Ph.G., D.D.S., Chicago. In this paper I have been asked to review modern methods of treating putrescent pulps and acute and chronic alveolar abscesses. I am happy to have this opportunity, for I appreciate that any *method* is only the way or the process by which ideals set up are realized; and during the last few years I have cherished certain ideals along these lines which I am optimistic enough to believe, have, in a measure at least, been realized; and have aided in placing the treatment of these conditions upon a more definite and rational basis.

In order to scientifically apply drugs and remedies to the treatment of the conditions under consideration, it is necessary that we have an intimate knowledge of the nature and character of the products of pulp decomposition. To acquire this knowledge we are led into a field which as yet has not been fully explored, for while a few investigators of our profession have given their attention to the subject of pulp decomposition, the conclusions as to the chemistry of the process are by no means uniform. This fact is to be regretted and may seem strange to the casual observer, but let it be remembered here that the difficulties encountered in investigating this subject are many and confusing; especially is this true of the investigator who is neither satisfied nor contented to make his statements at second hand or to advance theories from his unaided inner consciousness that cannot be substantiated by laboratory experiment or confirmed by clinical observation.

All authorities agree that the decomposition of the pulp tissue

is a gradual analytic process wrought, under favorable conditions, in the dead tissue by microorganisms. For convenience in studying this complicated process, the compounds resulting therefrom can be arbitrarily divided into two classes—*intermediate* and *end-products;* and I have previously called attention to the fact that it is largely the products of the putrefaction of the proteid, rather than the products of the fermentation of the carbohydrate constituents of the pulp tissue with which we have to contend in correcting the putrescent condition.

The intermediate products depend, to an extent, upon the character of the microorganisms in the tissue; but it is safe to say that ptomains and amido acids are formed. Some of these ptomains are volatile liquids of a characteristic, cadaveric odor, and, furthermore, are deadly poisons to animal tissue. All of them, together with the amido acids, are capable of being still further putrefied, producing as end-products, *ammonia* or derivatives and *fats* or *fatty acids.*

The other end-products that are produced more directly from pulp decomposition are water, carbon dioxid, hydrogen sulphid, and a semiputrid substance consisting largely of fats, depending upon the extent to which the putrefaction has progressed. Simultaneously with the decomposition of the pulp tissue proper, the dentinal fibrillæ are also broken up, as are also the constituents of the blood, and therefore the tubuli as well as the pulp chambers and root canals are filled with the intermediate and end-products.

Every dental practitioner knew, from sad past experience, that in this process some kind of mephitic gases were evolved, which, if confined, would produce severe pathologic disturbances, but just what the gases were and how the unfavorable conditions were brought about, we were left to conjecture.

From our study of the chemistry of pulp decomposition we have every reason for believing that the main gases produced are *ammonia* and *hydrogen sulphid.* When these gases are generated and cannot readily escape through the cavity, pressure is produced, thereby forcing the poisonous ptomains through the apices of the roots into the surrounding tissue from which infection,

septic pericementitis and in many instances an alveolar abscess result.

Now then, with this knowledge of the nature and character of the contents of a putrescent root canal, I feel that we can, with some degree of intelligence, select drugs and remedies to be used in the correction of the putrescent condition, which will not only destroy germ life, but will also act chemically upon these noxious products and change them into non-infectious and non-toxic compounds. In this connection it should be remembered that the putrescent condition has been brought about through the agency of microorganisms by a gradual analytic process; and among the products formed which must be considered in the treatment are *hydrogen sulphid,* the *poisonous ptomains,* and *ammonia* or derivatives, the latter gas being evolved from the further putrefaction of the last-named compounds or compounds of similar composition. It is well to remember also that *fats* or *fatty acids* are a class of end-products resulting from the putrefaction of proteid substances.

The main gases formed then are *ammonia* and *hydrogen sulphid.* Now it will be necessary to dispose of these gases in order to hermetically seal the cavity, an object, the accomplishment of which is much desired in the treatment of these cases; for by so doing we prevent the oral fluids from contaminating the medicine within the tooth, the medicine from escaping into the patient's mouth and the tooth from changing color during the time of treatment.

It has been known for some time that formaldehyd, a gas which occurs in commerce in a thirty-seven per cent aqueous solution and which solution is recognized by the United States Pharmacopeia of 1900 under the name of Liquor Formaldehyd or Formalin, will unite with ammonia producing urotropin, a solid, as $6CH_2O + 4NH_3 = (CH_2)_6N_4 + 6H_2O$. Formaldehyd unites also with hydrogen sulphid, forming, in my opinion, methyl alcohol, a liquid, and sulphur, a solid as $-2CH_2O + 2H_2S = 2CH_3OH + S_2$.

It is stated on good authority that this same gas, formaldehyd, unites with basic ptomains, forming inodorous compounds. By the use of formaldehyd, then, the *irritating gases* and *poisonous liquids* (largely ptomains), can be changed chemically into *non-irritating* and *non-poisonous liquids* and *solids.* The official solution of formaldehyd, however, is too irritating for general use;

therefore, inasmuch as fats result from pulp decomposition and are present as such in a putrescent root canal, a few years ago I suggested cresol as the agent with which to dilute the official solution and thereby modify the irritating action of formaldehyd. Cresol is now also recognized by the United States Pharmacopeia of 1900 under this name. Formerly the product was commercially called tricresol. This agent has a tendency to darken when exposed to light. It is recommended that a clear solution be obtained and then kept in an amber-colored bottle.

Liquor formaldehyd can be diluted with such other agents as phenol or creosote, if, in the latter instance, a small amount of alcohol is added to clear the solution. Cresol, however, is recommended for four principal reasons.

1. It is miscible with the liquor formaldehyd in all proportions, thus making, without the addition of alcohol, a good pharmacal product from which formaldehyd gas is constantly generated.

2. It is a good disinfectant, much more powerful than phenol.

3. It possesses an anodyne property which modifies the irritating action of formaldehyd.

4. It acts chemically upon the fatty compounds, thereby disposing to advantage of these substances.

In the successful treatment of the conditions under consideration there are three important factors which must be accomplished.

(1) Establish asepsis.

(2) Prevent recurring sepsis.

(3) Preserve or restore the color of the tooth.

Treatment of Putrescent Pulps.—In calling your attention to the method of treating this condition, which has proved very successful in my practice and which is now being used quite extensively throughout the United States as well as in foreign countries, I desire to emphasize the necessity for observing the details of the method. Our first duty here, as in all treatment cases, is to make a correct diagnosis, after which the rubber dam should be adjusted in every case where it is possible to do so, and all the teeth included sterilized. Then, with a suitable round bur, the pulp chamber is freely opened, exposing all of the canals, but making no attempt to remove the contents therein at the first sit-

ting. Now, on a small pledget of cotton, the following remedy is placed in the pulp chamber and over the mouth of each canal:

ORIGINAL FORMULA.

℞

Cresol,

Liquoris formaldehydi, ...aa f ℥ j—M.

Sig. Use as directed.

For convenience this remedy will be called *formocresol.* It is always best to seal the cavity with a quick-setting cement, for the remedy should be *hermetically sealed* and pressure must be avoided. To prevent the cement from filling the entire cavity and also to facilitate its subsequent removal, metallic or paper discs or even cotton can be placed over the remedy, filling most of the cavity, when only a veneer of cement is necessary to hermetically seal the same. This dressing can remain until you desire to have the patient return for a subsequent sitting. I prefer to leave it about two or three days. However, it can be safely changed the following day or no harm follow if it remains a week or more. At the second sitting the rubber dam should be adjusted, the teeth included sterilized and the dressing removed; after this the canals should be mechanically cleaned with a proper broach. If there be any odor in the canals, characteristic of putrescence, or if effervescence is produced by testing with a solution of hydrogen dioxid, the canals should be dehydrated with alcohol and warm air as thoroughly as possible and the original formula placed on cotton, this time loosely in each canal, and the cavity hermetically sealed.

In those cases where at the second sitting there is no evidence of putrescence, which will be found to be the general condition if the first treatment is properly employed, the original formula can be modified and used. It is not necessary nor advisable, however, to keep a modified formula prepared. It can readily be made at the time by taking two minims of the original formula on a clean watch crystal, and adding to this one or two minims of cresol, as thought best by the operator at the time. I suggest modifying the original formula to suit the condition at hand, because it is possible, by the careless or injudicious use of the formocresol remedy, to irritate the tissue in the apical area, resulting

in a sore tooth. I want to emphasize, however, that such a result is due to pure carelessness on the part of the operator. This dressing should remain for at least three days, by which time the remedy will have sterilized the entire tubular structure of the dentin, thus *establishing asepsis.* All that is necessary now to *prevent recurring sepsis* is to thoroughly fill the canals. This remedy will not discolor the tooth structure, and the fact that it not only can but should be *hermetically sealed in the cavity,* will prevent discoloration by the ingress of the fluids of the mouth. In case the color of the tooth crown was lost before undertaking the treatment, and being desirous of preserving same by an inlay or filling, the color can be restored by one or two applications of sodium dioxid.

Complications:

1. *Badly Decayed Root.*—This formocresol is very destructive to the soft tissues of the mouth, therefore the importance of always adjusting the rubber dam. If this cannot be done on account of a badly decayed root, it is suggested that care be taken in sealing the remedy in the cavity at the first sitting, and in placing the cement the original outline of the root can be approximated. After the cement has set, a band or matrix of gold or German silver can be fitted to and cemented on the root. In treating the case where there is a tooth posterior, it is best to place the clamp on this tooth and gently stretch the rubber over the band and thereby avoid loosening the same.

2. *Pulp Partially Alive.*—In those cases where the pulp tissue is putrescent in one or more canals of a multirooted tooth and alive in the other one or two canals, as the case may be, we will find much satisfaction in using the formocresol remedy. These are exceptional cases and it is difficult to know whether this condition exists until the second sitting. If there be much vitality in the live pulp tissue the formaldehyd from the remedy will probably make the tooth ache; but after we know the condition, our method of procedure is simple and the results will be certain.

A small pledget of cotton dipped in the remedy, can be gently placed over the mouth of the canals which contain putrescent material, and a thin, quick-setting cement flowed over the cotton. After the cement has set, the live pulp tissue in the remaining

canals can be devitalized or anesthetized as the operator deems best at the time. Formerly these were difficult cases to treat, but with a remedy which can be hermetically sealed in a putrescent root canal, the procedure is materially simplified.

I realize that the method of treating putrescent pulps here given is a radical departure from those generally advanced and, like myself at first, some experienced practitioners may hesitate to hermetically seal a cavity in a tooth which contains a putrescent pulp. The reason this could not be done in the past by the methods in vogue is that drugs, in most instances, were selected and used solely because of their ability to inhibit the growth or destroy the vitality of microorganisms. The fact that there were other things, such as irritating gases and poisonous ptomains, found in the canal and tubular structure of the dentin and also the further fact that it was as necessary to dispose of these substances as it was to destroy germ life, was not given the significance this phase of the subject merited. The treatment which is here outlined is along rational lines, for the remedy chemically converts the noxious intermediate and end-products of pulp decomposition into substances which themselves possess antiseptic and disinfectant properties.

Acute Alveolar Abscess.—The treatment of septic pericementitis and acute alveolar abscess is so nearly identical that they will be discussed here conjointly. In those cases where the patient did not present for treatment until the confined gases had escaped through the end of the root, carrying the poisonous ptomains into the surrounding tissue, it is our duty to try and aid nature in aborting an abscess. It is in these cases that good judgment must be exercised and extreme care taken. There is no condition which we are called upon to treat wherein a practical knowledge of pathology and therapeutics will serve us better than in this particular case. Frequently patients delay coming to the dentist until the infection has progressed to a point where all remedies will fail in aborting an abscess; but in many instances this result may be prevented by the proper use of drugs. The treatment here is practically the same as above for an ordinary putrescent pulp; for you never have a case of septic pericementitis or incipient alveolar abscess unless the pulp is dead and has undergone, partially at least, the process

of decomposition. However, if the tooth is extremely sore, as is usually the case, the patient need not be subjected, at this sitting, to the annoyance of adjusting the rubber dam. Keep the tooth as dry as possible, open into the pulp chamber, holding the tooth by some means while drilling, so that the jarring will not further irritate the condition; then carefully seal in the formocresol remedy with cement, after which our attention, if necessary, should be given to the treatment of the infected pericemental membrane. In order to control the infection, and at the same time aid nature in readjusting the abnormal condition, it is not only our privilege, but it is our duty in these severe cases to administer internal remedies. For this purpose alterative drugs and saline cathartics are indicated, depending, in a measure, upon the extent to which the infection has progressed.

One of the most prominent symptoms with which we have to contend is *pain*. In most cases the pain will subside soon after the local treatment, especially if the remedy, equal parts of alcohol and water, suggested by Dr. J. E. Keefe of Chicago, is used. This remedy is best administered in the form of a spray, using a watch case atomizer for liquids, forcing the spray well back into the nostril on whichever side the affected tooth is located. It is well occasionally, however, where the patient is nervous and has lost considerable sleep, to administer drugs which act upon the central nervous system, thereby controlling the pain. There are several drugs, which, if properly given, will produce the desired effect. I generally prescribe acetanilid in the form of the official compound powder or dissolved in whiskey. If our efforts in aborting the abscess have been successful the case from now on is treated as an ordinary putrescent pulp, otherwise it is treated as a chronic alveolar abscess.

Chronic Alveolar Abscess.—There are two varieties of chronic alveolar abscess—those without an external opening, except, perhaps, through a cavity in the offending tooth, and those which are discharging through a sinus. In these cases the decomposition of the pulp tissue is complete; the intermediate products (ptomains and amido acids) have largely been broken up and pus has been formed from the tissue and fluids surrounding the ends of the roots.

1. *Abscess without sinus.*—In treating that variety of alveolar abscess which is without an external opening except through a cavity in the tooth, our method of procedure is somewhat different. The tooth should be located, the rubber dam adjusted and the teeth included sterilized as before; then the pulp chamber is opened with a suitable round bur. Usually the pus flows freely, in which event it is permitted to do so, pressure being made on the tissue immediately over the end of the root. It should be our effort to mechanically evacuate as much pus at each sitting as is possible. This being done, we have no necessity for using formaldehyd in the same strength solution as in those cases where the pulp chamber, root canals and tubuli are filled with the intermediate and end-products. The modified formocresol remedy will be useful here. The canals should be dried with alcohol as thoroughly as possible and the remedy, on cotton, sealed in each canal. It is, however, at this sitting, impossible to get the canals dry, and it is unnecessary to have them so, for the remedy will penetrate where moisture is present. This is an advantage over most remedies suggested for this purpose. In those cases where there is a copious flow of pus at the first sitting, the original formula can be used, and the dressing should be changed every day until it can be removed without the pus flowing from the canals. When pus is forming rapidly at the end of the roots, the remedy soon becomes dissipated and neutralized and it is a loss of time to leave it in the canals more than twenty-four hours. Unless there be some complication, the pus formation should be checked in one or two treatments, at which time the modified formocresol remedy can again be used. It is now possible to change the dressing too often. The formation of pus has been checked and the tooth should not be disturbed for at least one week or ten days, in order to give nature a chance to effect a cure. If at the end of this time there is no evidence of pus and the case gives a favorable history, the canals can be filled. Should there, however, be a slight odor, although the tooth has not caused any trouble, we are not justified in filling the root. In these cases, we can further modify our original formula by taking one drop of the mixture and adding two or three drops of cresol. It should be remembered that the value of formaldehyd in any

remedy to be used in the treatment of these conditions depends upon the power this agent has of uniting chemically with the hydrogen sulphid, ammonia and poisonous ptomains. When these substances are not present, formaldehyd, especially in this strength solution, is contraindicated. This precaution is mentioned here because formaldehyd is an irritating gas and any remedy containing it should be modified according to the conditions as found.

Quite frequently in these alveolar abscess cases, after the formation of pus has been checked, we have a weeping of serum from the canals. An excellent remedy to use in this case is eucalyptol to which thymol has been added in the following proportion:

℞ Thymol .....gr. x
Eucalyptol .....f ℥ j—M

Sig.—Dry the canal as much as possible and hermetically seal in the remedy.

If this remedy fails to check the secretion and the fluid is *serum,* not pus, no hesitancy need be felt as to filling the root, although the canals cannot be dried.

2. *Abscess with sinus.*—In those cases where the pus is discharging into the mouth through a sinus, our first duty is to locate the offending tooth. This is generally a simple matter, for the reason that the sinus usually opens immediately over the tooth from which it comes. The pus, in making its exit, however, follows the line of least resistance and in some cases the condition of the process is such that the pus burrows forward or backward and opens through the gum several teeth removed from the one which is causing the trouble. These are the cases that are difficult to diagnose, especially where the abscess has been discharging for some time, when there is not much tenderness in any special tooth and where there are several devitalized teeth on this particular side of the mouth. Sometimes two teeth containing putrescent pulps have a common sinus. In this case, it would be impossible to heal the tract by treating only one of the teeth. The use of a silver probe will be valuable in all such cases. By gently working the probe forward or backward, the sinus can be explored and the offending tooth or teeth located without drilling into innocent teeth—a discouraging procedure to both patient and dentist. The tooth being located, all that is necessary to effect a cure,

there being no complication, is to force some bland solution through the root canal and sinus, thus being certain it is well established; cauterize the tract, hermetically seal in the canal or canals the same agent used for this latter purpose, or the modified formocresol remedy and at a subsequent sitting, the case giving a favorable history, fill the root. There are two objects in forcing a bland solution through the sinus—one is to be certain that it is open and the other is to mechanically wash out the pus. Whenever pus can be mechanically removed it is always best to dispose of it by this means, rather than to do so by the use of some chemical agent. It is common practice, after the sinus is established, to use a solution of hydrogen dioxid. This is often a dangerous procedure and *always unnecessary* if the first solution has been used in sufficient quantity. For cauterizing the sinus in simple cases, ninety-five per cent phenol has been largely employed. An excellent preparation to use for this purpose is a modified phenol solution.

℞ Menthol .....ʒ j
Thymol .....ʒ i j
Phenolis .....f ʒ i i j

Mix and heat.

Sig.—Use where indicated.

With the sinus well established, it is never necessary to place either of these solutions in a hypodermic syringe. I know of several instances where this has been tried with disastrous results. The remedy can be applied to the canals on cotton, when, with unvulcanized rubber and a suitable instrument it can be forced through the sinus. Alcohol is a positive antidote for phenol; the alcohol bottle should therefore be in a convenient place so that the remedy used in the canals can be neutralized at once when it appears at the mouth of the sinus. If this has been well done, it matters little what drug or remedy is sealed in the canals. The modified phenol or the modified formocresol solution will give excellent results if hermetically sealed in the canals for about one week. In cases of long standing, where we can reasonably suspect a roughening of the end of the root or process through which the pus has been discharging, it is good practice to use, as the cauterizing agent. a fifty per cent solution of phenol-sulphonic acid,

and in stubborn cases the pure acid can be employed. This agent rapidly disintegrates cotton, therefore it can be placed in the canals on threads of asbestos, wool fiber or silk and forced through the sinus in the usual manner, cauterizing the same and also chemically dissolving any sharp edges of the root or process which may be a source of irritation and prevent healing. I do not believe in delaying the root filling long after the sinus has been cauterized in uncomplicated cases; for by filling the root as soon as we are certain that the sinus is healing, we avoid a weeping condition, which usually exists and which is annoying when this part of the treatment is delayed for one month or six weeks as advocated by some writers. In these cases where the first treatment has been thorough and the case gives a favorable history, the root should be filled at the second, or at the most, at the third sitting. If the case does not yield to the above treatment, some complication can be expected. It is sometimes difficult to establish the sinus—especially on molar teeth. In all such cases, where there is no complication, the case can be nicely treated with the formocresol solution as outlined under treatment of abscess without sinus.

Complications.—There are many complications of chronic alveolar abscesses of both varieties (with and without a sinus)—the treatment of which, on account of the length of this paper, will not be discussed in detail; such as a denuded, absorbed or encysted root, those involving the vault of the mouth or the antrum of Highmore. In all such complications the general method of treatment should be modified to meet the conditions as they exist. For instance, in the case of an abscess without a sinus where we can reasonably suspect and where the indications point to a roughening of the end of the root, we ought not to expect to cure the case by simply sealing remedies within the canals of the tooth. If we do, we are expecting too much of drugs. Again in a case of an abscess with a sinus, where the pus has been discharging for several months, with the not unusual result that the end of the root or process, through which the pus has discharged, has become roughened, we should not expect to effect a cure by forcing phenol or modified phenol through the

sinus because such agents as these have no action whatever on the bony structures.

In most of the complications, the "acid treatment" is especially indicated and they will yield nicely if such agents as a fifty per cent solution of phenol-sulphonic, or a 15 per cent solution of trichloracetic acid, preferably the former, is used in the proper manner. Should the case not yield to the "acid treatment," we can often save the root by surgical interference, especially by excising its end. In my opinion, however, the end of the root should be excised only as a last resort and then under the most aseptic conditions.—*Dental Review.*

THE SURGICAL CORRECTION OF CLEFT PALATE AND HARELIP. By B. G. Maercklein, M.D., D.D.S., Milwaukee, Wis. There is probably no subject in the catalogue of defects of the human body that has not been the subject of recent investigation and study, and it is only reasonable to suppose that the cases of cleft palate have received their just share. But judging from the history of the subject, we are hardly justified in assuming this to be the case, the cause for which is hard to find. This may be partly due to the fact that those best fitted to accomplish any real progress are usually kept busy in other directions, and to the average practitioner the subject seems already exhausted or of insufficient interest to claim his attention, but there are some who are constantly working to bring out new points of interest or new methods to more easily accomplish what we desire and get more perfect results.

All surgeons who have ever operated and attempted to close a large cleft met with an almost insurmountable condition; that is, to secure sufficient material to form a flap or flaps of such proportions that the tissue would readily bridge the chasm. And if we do not succeed in approximating the edges the tension is very often so great that the sutures cut through the tissues and a partial failure at least is the result. To Garretson of Philadelphia belongs the credit of having been the first to study the causes of these failures and to call attention to the different anatomic structures entering into and forming the tissues under consideration,

and carefully noting the actions of all the palate muscles. This enab'ed him to overcome the difficulty to a large degree and by publishing the method placed the operation for the first time on a scientific basis. Yet this explanation did not fully meet all the requirements, and the operation has since then undergone a change and I may say very marked improvement. It is very evident that Dr. Garretson was perfectly familiar with all the details of cleft palate and everything pertaining to it, except one thing, and that was discovered by Dr. T. W. Brophy of Chicago, namely, that in a complete cleft the maxillæ are separated almost the exact distance of the cleft itself, and there is usually only a very small or no deficiency of tissue whatever. This discovery led to some very heroic methods to reduce the displaced and separated bones to their proper places in small children, and also to a very modified form of operation in adults. To approximate the separated maxillæ is the principal object of all surgical interference, and especially is this so if we attempt to get bony union of the palate processes of the maxillary bones, and in order to bring these processes together it is necessary to use considerable force. This difficulty increases with each day until a time is reached when it is not possible to approximate the bony surfaces. Just at what age this occurs, I am not able to tell. It varies with different children and you may succeed in one case at a certain age and fail in another, even younger than the successful case. I have operated on a number of cases six months old, very successfully, and have failed to bring the bones together in a case not over four months old. In fact, I fractured the alveolar border in the attempt, and the entire piece eventually sloughed away and left the poor patient in a far worse condition than as if no operation had been attempted, and I am not the only one who has met with that kind of accident. It is therefore quite evident that the method is not suited to all the cases or that we are not sufficiently skilled in its performance. It may be possible for an unusually skilled surgeon to make a success of a case where the average would possibly meet with failure; but regardless of the greatest proficiency the operation as usually performed is more or less injurious to the alveolar borders and sometimes seriously injures the tooth germs contained in them; but aside from this, traumatism is always very

great and must be taken into consideration in connection with the patient's general health and strength as regards a favorable prognosis. If we can avoid this injury to the patient in this operation we multiply the chances for success a great many times. When Dr. T. W. Brophy of Chicago performed the first operation, namely, the immediate closing of cleft palate on a little girl babe, surgeons with calloused consciences left the rooms because they did not wish to have it said that they were present at such a cruel and inhuman operation; but regardless of this, the operation proved a perfect success, and the world is deeply indebted to Dr. Brophy for giving us new methods for the relief of this deformity. The method as described by the doctor consists of perforating the alveolar borders sufficiently high to pass above the palate process of the superior maxillary bones and into the nasal cavity proper—one perforation in front of the malar process and the second behind it. Both sides are treated alike; then heavy silver wires are passed completely through the perforations from the buccal surface on one side to the buccal surface on the other, then lead plates about ⅜ to ½ an inch wide, and 1 inch to 1½ inches long, with two holes punched in them are used to correspond with the perforations in the alveolar borders. The silver wires are then passed through the holes in the lead plates and the plates pressed down on the buccal surface of the alveolar borders on each side, then the wires on each side are twisted together until the strain approximates the edges. The resistance, however, is so great sometimes that the wires will break without bringing about the desired result. Whenever the resistance is very marked it is recommended to sever the malar processes on both sides from the malar bones by subcutaneous section, then pressure applied with the fingers and sometimes followed with properly constructed forceps will usually succeed in bringing the edges together, which, of course, have been previously pared or freshened.

The wires are twisted sufficiently taut to keep the parts in apposition and the operation is completed. The usual care as regards antiseptics and keeping the parts as clean as possible under the circumstances is never to be lost sight of.

This is a fair description of an average case, but in bad cases the traumatism is very much greater, as I have indicated, and

aside from the injury that we are obliged to inflict, the method is open to another serious objection, namely, that we are obliged to proceed on the assumption that we will be able to approximate the edges, and pare the same in the beginning of the operation, as this cannot be so well done after the parts have been brought into contact. Should we fail to get perfect apposition or contact after all has been made ready we know only too well that the entire operation is likely to be a failure, and this probably induces us to resort to extreme measures in order to make a possible success of the case.

The wide clefts of babies are the most difficult operations to perform successfully, when such cases have been allowed to go until the bones have become very much hardened or ossified, for then the bones will not bend nor yield as easily as if the operation had been performed in the second or third week after birth. Dr. Garretson discovered a great many years ago that it was almost always possible to bend the bones sufficiently at birth or a few weeks thereafter so as to close the cleft. He demonstrated this on the body of a child after death by pressing the bones together and completely closing the cleft, and, of course, the question at once arose, how can this pressure be applied and retained so as to keep the parts in position until such times when union has taken place and the healing process sufficiently advanced and matured to be strong enough to retain the bones in their new position without any additional support. All appliances and experiments resorted to, such as the Hainsby compress, which is simply a circular spring passing around the back of the head and made to press on a pad placed on the cheek and fastened to the ends of the spring, or pads that were held in position by roller bandages or other means—were all found to be inadequate to perform the work required of them, or they could not be kept in the same position long enough to accomplish the desired object. Now, I do not believe that these men have reached the ultimate height of perfection and that nothing remains for us to do but to accept their judgment as final. On the contrary, I think we are just beginning to understand and recognize a few of the underlying principles by which we can more intelligently judge what is best suited in each case, so that we may be able to attain the best and

most perfect results that can be achieved in any particular case. Nor will I admit that we have reached the end of mechanical appliances that may be devised to serve as useful adjuncts in connection with the operation, for I am engaged at the present time in devising and perfecting such an appliance, and judging from the progress made so far I am hopeful that I will be successful to the end. Should this prove true, then we will have eliminated the most serious part of the injury that we are now obliged to inflict, namely, the perforation of the alveolar walls and the silver wires in the perforations to hold the parts together. The appliance is designed to take the place of the wires and of such construction that it may be retained in perfect position for several weeks if necessary and is under the complete control of the operator at all times. In fact, should it be found that it seemed impossible or inadvisable for any cause whatever to complete the operating at that time, the appliance may be left in situ and the work finished any time in the future; or should the case demand the entire removal of the apparatus it can be quickly and easily done, as it is not held in place by any wires or sutures attached to the patient, nor will it impair the parts or jeopardize the success of a future operation. This alone is a very long step in advance of our present methods, which are not always based on a correct scientific principle or a correct anatomic and physiologic knowledge of the parts involved, and this must very often lead us to attempt impossibilities, and, of course, meet with failure. To my knowledge no writer of text books or others have ever called attention to a proper course of preliminary training of the parts (the soft palate) or the bringing together of the hard tissues by slow degrees and to such an extent that the successful result of the operation is almost a foregone conclusion. This can easily be done in cases of children over two and a half years old, or after the temporary teeth are fully developed by banding both molars and cuspid on each side, then uniting the bands of each side by soldering a piece of gold plate accurately swaged and fitted to cover the entire buccal alveolar border. Then solder a gold wire around the upper edge of the plate, allowing the wire to continue on the distal parts of the second molar band in such a manner that it will form an eyelet at the posterior palatine angle of the second molar tooth.

the end passing forward and attached to the band of the first molar. This strengthens and stiffens the whole mass, and when securely cemented in place it will stand all the strain that may be applied to it by the screw, which must be made with a swivel and attached into the eyelet with a hook on each end previously accurately fitted. All that now remains to be done is to turn the screw in such a direction that the sides will approximate. It may be necessary to prepare several screws of different lengths, as the space in which to work the same becomes exhausted after the sides approach each other. The time to bring the parts together varies from three months to a year, according to the size of the cleft and pliability and yielding of the bones under this strain. It is not necessary to completely close the cleft or opening, especially if we use mucoperiostal flaps, which are used very successfully in a large number of cases. This is true in an adult, where the sides are high and well covered with a heavy layer of soft tissue, as this is the only part that directly enters into the construction of the flap which closes the cleft. It is very essential that it is not deficient in size, nor lacking in vitality, as either of these is almost a fatal defect to a successful termination.

It is not possible for the surgeon to supply or accurately ascertain the condition of either of these, and it is not an uncommon thing to have a part of the flap die or slough off some days after the operation, and for which the surgeon should not be held responsible. It is usually caused, however, by too much tension in approximating the edges, thereby lowering the vitality and obstructing the circulation. Too much care and attention cannot be given to these points; the operation and closing of the cleft in this manner as described by Dr. Brophy of Chicago, consists of the following, namely, separating of the periosteum with the mucous membrane and other tissues en masse from the palate portion of the superior maxillary bone and the palate side of the alveolar borders commencing at the highest border of the cleft and continue until the flap becomes large enough to reach the median line without much stretching. This is repeated on the opposite side and may be carried down to an eighth of an inch of the necks of the teeth if necessary, to obtain sufficient material to span the chasm, bearing constantly in mind that you endanger the life and

vitality of the flap in proportion that you are obliged to separate it from its bony attachment. Great care should be exercised to avoid wounding or cutting the posterior palatine artery, as it is the principal artery to supply these parts with blood, to say nothing of the severe hemorrhage which follows and is usually hard to control. The next important step is to separate the nasal mucous membrane completely along the posterior border of the palate bones to such an extent that the flaps are free to drop down to the extent that they may be easily approximated. The parting of the edges of the remaining portion of the soft palate or splitting the same is now in order, or this may be done at the very beginning of the operation. We are now ready to introduce the sutures, which consist of two kinds—the tension and the coaptation. The first consists of four wires introduced as close to the alveolar border as it is possible to get them in the front part of the mouth and as far to the sides as it is safe to place them in the soft palate without destroying their usefulness to relieve the tension. These wires are placed about ½ inch apart, two in the soft palate and two in the anterior part of the mouth; they are introduced by first passing a silk thread through the entire thickness of the soft palate or other portions of the flap wherever the wires are intended to be placed. This can best be done by using a needle with an eye at the point and armed with a silk thread, introduced from without inward from the sides toward the median line and bring the point of the needle in view in the cleft. Now catch the thread with the tenaculum or small pliers, hold on to the thread, and withdraw the needle in the reversed way that it was introduced and you have one-half of a suture in situ. Proceed in like manner on the opposite side and you have two looped threads in the middle of the cleft. Now place the loop end of the first thread through the loop in the second thread and draw it out in the same way as you did the needle, and you have a complete double thread in place. Care should be taken that the thread is not drawn completely out; this can be avoided by twisting the ends together and clasping a hemostatic on. Now take a silver wire No. 24 gauge and bend one end to form a loop, place in this looped end the silk thread and press the wire loop closely together, carefully withdrawing the silk thread the reverse way that it was intro-

duced, and you have a silver wire tension suture in position. Proceed in like manner until all are in position, then take a piece of lead plate No. 26 gauge about one-third of an inch wide and long enough to extend one-fourth of an inch beyond the first and last wire. The lead plate is provided with four holes to correspond as nearly as possible to the position of the wires, and the first and second wires put through the first and second holes and their ends twisted together. The third and fourth wires are treated in like manner; then finish the other side of the mouth in the same way. You are now able to make tension on the flaps by twisting the wires more and more until the edges approximate. Now the usual interrupted coaptation sutures are introduced and tied, and the case is finished. In the after treatment, an antiseptic spray should be used every hour for a number of days except when the patient sleeps. If the nasal spray or douche can be used without much annoyance or irritation to the patient, it is always well to employ it, as the greatest extent of the wounded surface is toward the nasal cavity. In case the silver tension sutures cut through the tissues, little heed need be given to it, as the little holes will usually close again of their own accord, after all the wires are removed.

In the course of this paper I have called attention to the necessity of bringing the different parts into a condition so favorable that the success is a foregone conclusion. This can and ought to be done, or at least attempted, in every difficult case where there is any doubt about the ultimate success of the operation. It is not generally known that considerable contraction of the maxillæ or a narrowing of the arch takes place in a large number of cases that have been treated successfully by an operation, without any apparent or at the most only a slight disturbance of the occlusion of the teeth. It seems that the narrowing process is so slow that the teeth in the lower jaw have ample time to accommodate themselves to the new condition. When I first observed this contraction, I could not account for it, and wondered what could possibly be the cause, as the small amount of secondary formed connective tissue could not possibly be responsible for so large a contraction as was present in some cases and could be easily seen in the dif-

ference of the size of the models made from impressions taken before, and one some years after the operation. The solution, however, is much easier than I had anticipated and can be summed up in one word "tonicity." As this is the force which holds the teeth in a position and not pressure, it is easy to understand that the same force will be exerted on the arch after the parts have been placed in a normal or almost normal condition.

While studying these the thought occurred to me. Why do we not take advantage of this and bring the contraction about in an artificial way, and thereby lessen the size of the cleft? The only thing to be done was to devise some method by which it could be accomplished, and led to the method described in the beginning of this paper.

Fear of contracting the arch too much need not be entertained, as the tendency of the parts to return to their former position is always present and will contribute to correct any irregularity of the occlusion that may have been caused by the contraction. If, however, the occlusion continues to remain defective, after the lapse of six months or a year, it can be easily corrected by the usual methods employed to expand the arch.

If there is any deficiency of the parts that constitute the soft palate, or only a marked contraction present, it will almost be useless to attempt to close the cleft by an immediate operation, as the tension necessary to approximate the edges is so great that in a large number of cases the sutures will cut through the tissues before union of the edges has taken place, and of course a failure is the result. A systematic preoperative course of teasing, stretching or pulling of the part should always be instituted and carried to a successful conclusion. This should always be done by the surgeon wherever it is possible, and in any case should always remain under his direction.

Whenever a patient lives at a distance, some member of the family can be instructed to do it. If a properly constructed pair of pliers or tweezers are used, it is a comparatively easy task. All that is necessary is to put the parts on a stretch, a little only at the beginning, and gradually increasing it until the parts become soft and yielding and can easily be stretched to approach each other. This treatment should be continued for weeks or months,

or until the desired effect is attained. With a case prepared in this manner a successful termination is almost a foregone conclusion.—*Dental Review.*

A NEW AND ACCURATE METHOD OF MAKING GOLD INLAYS. By W. H. Taggart, D.D.S., Chicago, Ill. I come to you tonight with something new—something which in my fondest hopes for improved and more practical methods of filling teeth I had not thought to realize.

It never occurred to me that I would be the one to devise those radical changes which I knew must come in order to make any decided progress; for you will have to admit that our chief improvement in the line of gold inlay work in the last ten years has come more from our increased dexterity, due largely to our experience, than from any novelty of methods.

Of course, individually we have improved, and our gold inlay of today is much more sightly and mechanically more correct than it was five years ago; we have changed one method for another, and by a gradual growth the making of the present gold inlay was evolved; but the same foundation was being builded upon; a matrix, either gold or platinum, was burnished to the cavity, or to a cast of the cavity, and this was filled with solder or gold scraps; or a swaged articulating surface soldered to this matrix. All this has been the practice, and with good results; but we have reached the limit of improvement by these methods, and something radical must come or we will cease to improve the gold inlay.

One method I have the pleasure of showing you tonight; if by chance in my enthusiasm I should say too much, and thus spoil my concentration, or if I should say the same thing too often, remember I am imbued with the same idea that runs through that old religious song, "I love to tell the story, because I know 'tis true."

Before I present to you my special method for gold inlay work, I wish to make a few remarks on some of the underlying principles which pertain to all kinds of inlays, gold or porcelain.

Underlying Principles in Inlay Work.—There is no doubt in my mind that the inlay principle for filling teeth has come to stay, chiefly because it is a better tooth-saver. I have never advocated any method in dentistry solely because it was easier, but if it be better,

and incidentally is easier, I am heartily in favor of it, and this seems to be the position the inlay principle takes in my practice. When I say it is a better tooth-saver, I know I am treading on the sacred ground of some who believe, first, last, and always, in the gold foil filling, and who point to a number of records of fifty years of good service for foil fillings; but in their eagerness to stand by an old friend they fail to state the thousands of just as perfect fillings as the fifty-year-old ones, that have not lasted three years, not because they were not mechanically correct, but because of the low-grade tooth-structure on which the filling was built. No two substances such as gold and tooth material can come in actual contact, consequently there is always a chance for capillary attraction to take place; but in the case of the long-lived filling it makes no difference about capillary attraction because the tooth structure is good; in the short-lived gold filling, however, the structure is faulty, and along with this is a bad environment, and then capillary attraction takes place and bad results follow. In case an inlay is put in a tooth of faulty structure the capillary condition does not exist, consequently the mechanical cause for leakage is no longer present, and the tooth structure, in spite of its environments, resists decay. I have had inlays come out, and have also seen some mighty poor ones, but I have never yet seen an inlay fail from recurrent decay.

An inlay is an honest filling; it is either in the tooth, and saving it from decay, or it is in the appendix.

I will have nothing to say on *cavity preparation* except this: If a cavity be a suitable one for a gold inlay, no steel tool should be used in its preparation; carborundum stones of suitable sizes and shapes are far preferable. The inlay is put into cavities with beveled margins, and no steel instrument can compare with a carborundum in forming these margins. I say suitable carborundum wheels should be used, but they are not on the market, so I pass around for inspection wheels mounted and shaped for this purpose, and also I pass a file such as I use to shape these points, filing them to shape while revolving in the handpiece. As this inlay process can be made practically painless by use of these stones, why use a steel instrument? The difference in comfort to the patient between the two is as great as between a pneumatic tire and an old-fashioned farm wagon wheel.

A year or so ago Dr. Poundstone, of Northwestern University

Dental School, read a paper on cements, and by a series of elaborate experiments showed that the cement took up all of the space occupied by the 1/1000 inch platinum used as a matrix, and consequently there was no use in having a matrix thinner than this gauge, as the cement had to occupy the 1/1000 of an inch, anyway, whether the matrix was thinner or not. I knew some of my inlays stood away from the margins considerably more than this, and some of them a great deal less, so I immediately combatted his idea, and have since incorporated my own explanation in all of my inlay work. It is this:

The grains of cement pile up on top of each other the same as so much sand does; now, when direct pressure comes on these grains, those which can get out of the way do so, but the others remain one on top of the other, and the harder the pressure the less apt they are to assume a new position.

Take, for example, the method of the molders in a foundry. They throw up an irregular pile of sand, and on top of this they put a molding board; do they then put direct pressure on this to embed it? No. They could put their whole weight on it, and it would embed but a little; but they give it a rubbing movement, so as to push one grain of sand off from another, and in this way they get it to seat itself.

Take the bricklayer. Does he put the mortar down, and the brick on top, and put his weight by direct pressure on it? No, he taps it from side to side and end to end, in order to have the grains of sand roll off each other.

Now, apply this principle to inlay setting. Many are in the habit, as soon as the inlay is approximately to place, of putting direct pressure with an instrument or with a wooden wedge, and by so doing placing the cement grains in a condition where they cannot roll one away from the other, but are on top of each other, and will not allow the inlay to be seated, which to my mind is the cause for an excessive cement line between the inlay and the cavity in what would otherwise be a close-fitting inlay. Now, in the gold inlay I would avoid this by using a mallet and a hardwood stick, and go forward and back across the corners, and down the center and back again, and keep this up for quite a few seconds.

In the case of a smaller approximal porcelain inlay, I would press the inlay approximately to its seat, and then take a piece of

linen tape, about a foot long and wider than the inlay, and draw its full length against the inlay; this absolutely wipes all the excess cement away, and seats it as well as direct pressure can do. Now for our principle:

At this stage take a very narrow tape, viz., one-sixteenth of an inch wide, and use this as you would a polishing strip, going from end to end of the inlay, as you would in polishing a gold inlay; anyone who has not tried this or a similar method will be surprised at the excess cement which squeezes out, because the grains of cement have been allowed to roll away from one another.

The dissolving of the cement line I have never found to be a serious element in the life of the inlay, as the depth to which it dissolves is only equal to the width of the line, consequently it does not leave exposed any vulnerable point, and no leakage can take place under the inlay, as capillary attraction as a force has ceased. But in a good foil filling this same amount of defective margin would be fatal to the life of the filling.

The New Method.—What I now present to you as my process for making gold inlays under the title "A New and Accurate Method of Making Gold Inlays" should have had a more comprehensive name. The title should have included bridge work and gold plate work, for I believe it will be the coming method for making partial gold plates and bridges as well as inlays. The title also should have included some information in regard to the time consumed, for this is one of its greatest points. By this process I can make gold inlays of the most complicated character in from thirty to forty minutes, inlays which have always taken me from three to four hours to make. In fact, there is not an inlay which I show you tonight that has taken more than thirty-five minutes to make. This, of course, does not include the cavity preparation or cementing to place, which is the same with this inlay as with any other; the thirty-five minutes is the time actually consumed in manufacturing the inlay.

The process is as follows: After the cavity is prepared, a piece of special wax which has been filtered several times through fine filter paper, in order to remove every trace of foreign matter, is warmed and then pressed well into the wet cavity with the fingers, and the patient is allowed to bite into this in any and all directions, as in mastication. This gives an imprint of the opposing cusps in the wax. The wax is now raised out of the cavity just enough to un-

seat it, and show that it is not sticking to the cavity. At this stage the wax is chilled slightly with ordinary hydrant water and the excess wax is trimmed away. Always during this shaping process be sure to keep the wax at an easily workable temperature.

In other words, make a wax inlay the exact shape you wish the finished gold one to be. Any artistic effects put on the wax at this stage will save time in the end, because wax is much more easily carved than gold, and by carving with instruments lubricated with perfumed vaselin one can soon become expert in making wax inlays. If the cavity is so situated as not to have an adjoining tooth to help hold the wax in place while carving, the whole mass of wax can be chilled and carefully lifted from the cavity, and then, keeping it thoroughly chilled under the hydrant water, it can be carved, can be carried back to the cavity any number of times, thus being carved out of the mouth, and the final adapting of the margins is quite easy.

We now have a perfect wax inlay made of a material which has no foreign matter in it. Into this wax inlay [illustrating] a sprue wire is set by warming it sufficiently to melt it to the wax. The wax inlay with its sprue attached is now fastened to the lid of the flask, which is also a crucible mold. The inlay is then wholly embedded in an investing material, and when this has hardened the lid is removed from the flask, and the sprue wire comes with it, which now leaves a crucible with a hole leading to the wax inlay. The flask is put over a flame and slowly heated up, and the wax is absorbed into the investing material and leaves a mold the exact shape of the wax inlay. You see there is no separating of the flask to get the pattern out, as is always done in any other kind of molding.

The flask is now put into the molding machine, which has a nitrous oxid blow-pipe flame for melting the gold and a compressed-air attachment for forcing the liquid gold into the mold under a pressure of from 25 to 40 pounds to the square inch. The nitrous oxid flame is almost a necessity, as it is only by this flame that the gold can be made liquid enough to cast and cool without shrinking.

When the nitrous oxid flame has heated the gold much beyond its melting point, the lever is quickly brought down, the flame is automatically switched away and the compressed air is automatically thrown in on top of the liquid gold, which, of course, must go into

the mold under heavy pressure. Sometimes cracks have developed in the investing material and the gold was forced into these minute crevices in sheets as thin as tissue paper, showing how liquid the gold may become.

The actual time consumed in forcing the melted metal into the air-tight mold under this heavy pressure is probably but a fraction of a second, but the success of the whole process depends on this speed.

I have kept pace with all former molding processes, and find that by the time the metal is melted and poured into the mold by gravity it has become chilled enough to be thick, and not in a thin liquid form necessary for fine casting. My process, as I will show you, takes advantage of every fraction of a second of favorable conditions, and by having this heavy pressure on top, with no possible chance for gold or air to escape, the liquid gold is forced in; and by liquid gold I mean gold in a boiling state—a great number of degrees beyond its actual melting point. While it is in this freshly molded condition the pressure is maintained for a few moments in order to allow the molten gold to thoroughly congeal; either this continued pressure prevents the gold from contracting or the amount of expansion in the hot mold is equal to it; at any rate, the filling fits.

Some have suggested that being composed of the purer and high-grade metals there is less expansion and contraction than with low-grade metals, which I think is true in a measure, but there must be some other reason, for we all know that the coefficient of expansion and contraction is different in each metal, and yet metals—gold, silver, copper, brass—all fit the cavity perfectly. My theory is this: The molten molecules of metal are forcibly thrown into the mold and held there, and consequently are not allowed to rearrange themselves, as they would do if not under pressure. And now in conclusion I will say that this is no careless man's process; but I do say that I can take the most ordinary workman in this audience, and if he be a man who will obey instructions to the letter and not allow his own ideas to creep in from the start, I can show him in a half-hour how to make gold inlays better in every way than the most skilled workman can do by any other process to date; and if allowed to instruct the already skilled man he will make such an inlay as he never dreamed could be made.—*Dental Cosmos.*

THE LOSS OF TEETH IN CHILDHOOD AND ITS EFFECT ON OCCLUSION AND THE FACE. By D. W. Flint, D.D.S., Pittsburg, Pa. Since taking up the work of orthodontia it has been my privilege to observe more carefully the existing diversity of opinion among practitioners concerning the care to be bestowed on the deciduous dentition and its importance in its bearing on facial and dental development. That it is an important subject all admit, but that they do not sufficiently impress it upon the parents, pointing out the degree of hygienic care that should be given, is, I believe, likewise the case.

It is my purpose to show you to what extent the premature loss of even a single deciduous tooth will affect the permanent dentition, and how caries by destroying the approximal contact of the teeth may cause a shortening of the jaw on that side, especially in the case of lower teeth, throwing the whole mandible into malocclusion and marring an otherwise good face.

I take it that everyone here understands the importance of the normal relationship of the jaws, teeth and contiguous parts, and it is only to those who realize this that I address my remarks. The man who is practicing dentistry for selfish reasons cares nothing for this law of occlusion; but to the ethical practitioner it is of vital importance that in not a single restorative operation should he lose sight of the natural harmonious arrangement of the teeth, viz., normal occlusion. This is the platform on which not only orthodontia but the whole of dentistry must stand.

The study of malocclusion in childhood involves a consideration of the following important causative factors:

(1) Premature loss of the deciduous teeth.

(2) Prolonged retention of deciduous teeth or roots.

(3) Loss of the permanent teeth, including the first molars, by extraction.

(4) Tardy eruption of permanent teeth.

(5) Non-eruption of permanent teeth.

Before taking up these five causes seriatim it may be well to make the axiomatic statement that a face is only as nature intended it to be when all the teeth are present and all in proper alignment.

The function of the deciduous teeth is twofold—namely, they are the organs of mastication until their physiologic loss; and, again,

they assist in a mechanical way in developing the alveolar process and the jaws proper. Close to the time of eruption of the permanent teeth there occurs a gradual lengthening of both lateral halves, and if there be no caries on the approximal surfaces and all the deciduous teeth be present and in correct alignment the first molars will erupt between the maxillary tuberosity in the upper jaw and the ascending ramus in the mandible. Coincident with the development of the jaws the deciduous teeth are carried forward and the normal mesiodistal lengthening takes place. The anterior region develops laterally. We should be able to observe the presence of these developmental spaces, and if we do not some means should be resorted to whereby this normal widening may be induced, for otherwise a crowded condition of the permanent teeth will be the result. If for some unaccountable reason the development above referred to does not take place, the expansion of the arches can easily be brought about in order to assist nature in what, left alone, she failed to accomplish; for to those who have read Dr. Bogue's recent paper, "Theories Made Facts," it is quite clear that the condition will not improve of itself.

Premature Loss of Deciduous Teeth.—If the first deciduous molar should be lost, what will be the consequences? The first molar will exert its wedging influence upon the second deciduous molar, pushing it forward—the natural tendency of tooth movement—but as lip pressure will force the anterior teeth backward, the space previously occupied by the first molar will be obliterated. If this tooth be lost on one side only, there will be an inequality in the length of the sides of the jaw, with all the attending malocclusion, especially if this molar be a lower one.

Perhaps the deciduous cuspid is sacrificed more often than any other tooth, in order that the permanent lateral incisors may occupy their normal position, but what of the oncoming permanent cuspid? Lip pressure pushes the anterior teeth backward in normal breathers, while the first molar is doing its work of pushing forward, and soon we find that the first bicuspids are in contact with the lateral incisors—a condition resulting in supra and labial occlusion of the cuspids, one of the most disfiguring of dental irregularties. In such cases, do not extract the first bicuspid, expecting nature to push that cuspid down, but give the child the face he or she would have had;

expand the arch, thus bringing the incisors forward and providing space for the cuspids to assume their normal position.

Right here some morals might be pointed—as: Do not extract the deciduous teeth. If carious, fill them, especially if on the approximal surfaces, thus restoring normal contour; if absent, maintain the spaces by "G" wire attached to bands and adapted to the teeth anterior and posterior to the space, thus placing the arches in a condition which will lead to normal development.

Again, in the presence of short-bite teeth when the deciduous laterals are lost prematurely, often the permanent centrals will drop into occlusion just distal to the lowers.

Prolonged Retention of Deciduous Teeth or Roots.—In some cases nature, for some unaccountable reason, fails to absorb the deciduous roots, which of necessity will deflect buccally or lingually, mesially or distally, an erupting tooth, if the roots are not extracted.

If we should be in doubt as to the condition of the roots of deciduous teeth, there is but one way of deciding upon the procedure, and that is by means of the X-ray. I have in mind now a patient of a family who from hereditary conditions have all—grandmother, mother and daughter—failed to erupt the two permanent laterals above and below. By the use of the X-ray we can determine how best to give the young patient as good a mouth as possible under the circumstances, awaiting the time when the lost organs can be replaced by bridge-work.

Loss of Permanent Teeth.—When permanent teeth are lost the shortening of the arches is involved in just the same manner as in the loss of the deciduous teeth. It would seem superfluous to allude to the evil effects resulting from the extraction of the first molar, but as this question is an integral part of the subject under discussion, some reference to it appears to be indicated. I agree with Dr. Bogue in naming this tooth the principal molar, for it cannot be lost without serious evil resulting. That some practitioners are compelled to commit this professional crime I will admit, but surely no one in this age—with all the modern methods of treatment and other conditions for restoration, and with our mechanical devices—would be guilty of ruthlessly removing a good molar, or even a very bad one, until after all endeavors had failed to restore such a tooth to a healthy condition.

There appeared some years ago an article by Dr. Mitchell of Lon-

don, which is of interest as it shows the stuff that is being printed, from which we dentists are supposed to get a good intellectual meal. He said, "The points I wish to bring out are when and why the first permanent molar should be extracted. I purpose by my deductions, based upon experience, to convince those who have heretofore been opposed to the extraction of these teeth that we have a practical and legitimate means of preventing to a great extent the ravages of dental caries, especially that produced by lateral pressure, and the securing of a more serviceable dental armament by the more perfect safeguarding of the interproximal space than is possible by flat and imperfectly contoured fillings; and later, by affording patients a more perfect masticating surface; and last, but not least, the satisfaction of securing to the patients in the most practical way probable immunity from constant and prolonged dental operations the greater part of their lives." Such teaching as this is just what some men are looking for, because it is an easy way out of work, good and hard at times, and if one could only hush conscience and hide behind such teachings for a justification of this perhaps greatest crime, how happy they would be!—for "If the other fellow does it, I guess I will." When shall we extract this most important tooth in the whole arch? Never, if there is any possible way of saving it. I tabulate some reasons why this principal molar is so important and should be retained at all cost:

(1) Its loss interferes with the active force concerned in the development of the jaws mesiodistally.

(2) It is necessary for mastication at a time when the deciduous teeth are loosening up and are being lost, and it is from a physical standpoint the largest and most powerful of our grinders.

(3) Its loss shortens the jaw on whichever side it is lost, and produces a marred facial expression, oftentimes amounting to a real deformity.

(4) Its loss affects speech. I had one case where, owing to the boy losing the upper first molars previous to the lower, the upper anterior teeth dropped into lingual occlusion, and the spaces between the upper and lower bicuspids caused a constant hissing sound when articulating. "Why, I can talk plainly," were his first words after the regulating appliances were removed.

(5) The first molar determines largely the relative overbite, and if it be lost prematurely the size of the entire oral cavity is

materially lessened and at times the tongue is cramped for want of space.

(6) When this keystone is lost we never know in what direction the shifting of the teeth is going to take place. At times the second bicuspid will drift back toward the second molar. The latter almost invariably rotates, thus destroying the relationship of the cusps for even a fair mastication, and then we find the interproximal spaces open for the accumulation of food particles, which, in turn, cause pain, inflammation and alveolitis.

(7) When the first molar is lost the second tips forward, pushing the upper jaw forward and the lower one backward. It changes the relationship of the lateral halves.

(8) The cusps on the remaining teeth are worn unduly and abnormally, owing to the loss of support and extra stress on their inclined planes.

(9) It is the best tooth for the anchoring of either fixed or removable appliances in the treatment of irregularities.

(10) It is also a good tooth for diagnostic and retentive purposes.

(11) Its loss interferes with the development of the maxilla, which, in turn, affects the allied structures in the nasal cavity, and it does not require a very great stretch of the imagination to picture a patient with a short upper lip and end-to-end occlusion—such a patient losing, say, a lower molar would have to put forth an effort to close the lips at all times, and in a short time would be compelled to keep the mouth open, and acquiring the mouth-breathing habit would be subject to any and all the ills which may be indirectly caused by the absence of nasal breathing.—*Dental Cosmos.*

DENTAL EDUCATION. By W. Simms, L.D.S.I., Manchester, England. To the members of the dental profession the subject of dental education must always remain of perennial interest. It is so many sided that it cannot be exhausted, and the conditions and requirements regarding it are so constantly changing that a discussion of it can scarcely become stale or profitless.

It is because I think some aspects of this question have not received adequate consideration that I venture today to reopen the subject, and because I believe, too, that the more we ventilate

the subject the more likely we are to reach sound conclusions and to build on a secure foundation.

I am now only proposing to consider chiefly the relation of the mechanical to the operative part of the dental student's education, a question which is not a new one, but which has been revived by the latest regulations of the Royal College of Surgeons of England, and which has received startling emphasis by reason of the recent recommendations of the House of Lords Committee in regard to the "Dental Companies (Restriction of Practice Bill)" recently before Parliament.

For a wider grasp of this question, we need, I think, to have in our minds a recollection of the evolution of the dental profession in England during the last fifty years.

Prior to 1860 there was no qualification in dentistry open to any dental student; dental hospitals were non-existent, and the only means of acquiring a knowledge of the dentistry of that day was by apprenticeship to the dental practitioner, the recognized duration of which was from five to seven years.

As stated by James Smith Turner in his posthumous reminiscences, "this method afforded in most cases little or no means of acquiring a knowledge of the surgical and operative sides of dentistry, but left the student to grope about for the necessary knowledge as best he could." Of course, the work of the dentist of fifty and more years ago was not so many sided as now, and the acquired knowledge of dental mechanics would meet a comparatively larger portion of the every-day requirements than the same amount of restricted knowledge would cover the larger field of present-day dental practice.

It was inevitable that when, in 1860, the College of Surgeons of England instituted an examination in dental surgery, it should accept the then existing apprenticeship as a necessary requirement for acquiring a knowledge of dental mechanics, since no other means were then available for obtaining the knowledge. Hence the regulation so often quoted (but not always understood), "of having been engaged, during a period of not less than three years, in acquiring a practical familiarity with the details of mechanical dentistry, under the instruction of a competent practitioner," a regulation which became a requirement of the Medical Council

when that body took over the control of dental education on the passing of the Dentists Act in 1878.

It is under this requirement that mechanical training for the dental student has been carried on from 1860 onward to the present time. During the last half-dozen years the alternative of taking the apprenticeship at a dental hospital has been possible, so that at the present time we have the one system of apprenticeship for mechanical training, and which, at the option of the student, may be taken with a registered dentist or in the department of a dental hospital where the provided courses of training in practical dental mechanics are satisfactory to the examining body.

Shall I shock my friends if I state my sincere belief (and I do it as "with bated breath and in whispering humbleness") that if we could disassociate ourselves from this idea of mechanical apprenticeship it would be an infinite gain to dental education?

There is nothing sacred about a three years' apprenticeship, and only as it may justify itself by satisfactory results ought it to continue in its present form. How far I may carry you with me in these expressions of opinion I do not know, but the Council and members of the North Midland Branch are responsible for the statement that certain statistics "show clearly that even in the simpler forms of mechanical dentistry, such as vulcanite work, the training provided by the apprenticeship is very far from being efficient, and that in some of the higher branches of this work real training is practically non-existent."

This is probably too sweeping a generalization, for under exceptionally favorable conditions the apprenticeship system has turned out some of our best students and might be counted upon to do so in the future; but as a statement dealing with things as we know them to be, there is enough truth in the statement to suggest a doubt as to the conditions of dental education in this respect being ideal. In the criticisms which have been passed on the action of the Royal College of Surgeons of England, and the discussions which this action has aroused in the Association and its Branches, several important considerations have been lost sight of, and should, I think, in fairness, be remembered.

First.—The original requirement never demanded an apprenticeship to mechanical dentistry for three years, but explicitly stated

that a student must have been engaged *"during* a period of not less than three years in acquiring a practical familiarity with the details of mechanical dentistry," which is not quite the same thing. There is no reason why this requirement should not be fulfilled to the letter, even though an examination in dental mechanics is taken at the end of the second year of study.

Secondly and mainly.—There is absolutely no alteration in the minimum time which a student must devote to professional education, which still remains at four years. Under the old regulation it was the common and legitimate custom for students to complete their professional education within this period, and, this being the case, the present outcry against the College of Surgeons of England is somewhat overstrained and illogical.

If the Royal College of Surgeons could be induced to definitely include the subject of dental mechanics in its final examination for its L.D.S., and, further, require evidence that during the last two years of the students' education courses of instruction in dental mechanics have been provided, then, I think, all objection to its new regulations would be met. It is in this direction, I think that the voice of the profession might be effective.

I hope that you will not think that I am speaking ironically if I now avow myself a strong advocate for a thorough training in dental mechanics. I myself served an apprenticeship of five years, and I think it so important that I would hold to it tenaciously in any scheme of dental education. I am not so much against a three years' apprenticeship as I am in favor of a training in dental mechanics during four years, but a good deal of this training must go on with other studies. What I would like to see done, and what I think our dental hospitals are now after some experience ripe for doing, is this: To take the four available years of study and map out for these years courses of work covering the various departments of work and including courses of practical dental mechanics in each year.

The first two years' practical work would inevitably be mechanical, and the student would go through courses of instruction leading to the knowledge of the construction and adaptation of vulcanite and metal dentures to the mouths of living patients.

This stage reached, mechanical and operative procedures should

proceed concurrently; they cannot by any possibility be separated. For instance, the construction to the mouth of crowns and bridges; porcelain restoration by filling, facing, or denture; the construction and application of regulation appliances; cleft palate cases; these are all branches of work which are partly mechanical, and where the correct application of mechanical principles is of the utmost importance, which no mere apprenticeship provides for, but which should be taught systematically and thoroughly, with other branches of work, as, for instance, continuous gum work, during the latter years of the students' time.

It may indeed be regarded as applied dental mechanics when the principles learned during the earlier portion of the students' training are applied in various directions to the mouths of living patients, and when the students' growing knowledge of operative and surgical practice permits him to do this with judgment, and with safety and success.

It is this application of combined knowledge which makes the dentist, and which, through the dental hospitals, must be made more thorough and complete. It is not so much the number of years required by a student that is important, as what he does in those years, and I am strongly of opinion that the present four years' minimum course of study fills the present necessities if the time is wisely spent, and the courses of study methodically arranged and efficient teachers provided.

The requirements for the dental training were originally made with remarkable prescience and wise latitude. Although the dentistry of to-day is so different and many sided compared to fifty years ago, it is still possible under these regulations to so adapt our system of education as not only to fulfil the requirements of the Medical Council, but also to meet the altered conditions of present-day practice.

A great responsibility rests upon our dental hospitals at the present time to meet these present imperative needs. The large and increasing number of dental students taking the whole of their training at the hospitals makes it possible to devise a system of teaching which will be both economic of time and effective in its results; but both in the provision of the most perfect appliances, the adoption of the best methods, and the providing of the most

efficient teachers, the imperative needs of the dental student must be met.

Suggestions have been made at various times that other courses of manipulative and other work might usefully be added to the dental curriculum. I am free to confess that in many directions useful knowledge might be acquired by the student. Within my own experience I have seen the advantage of a training in an engineer's workshop; I have known several students whose previous training as chemists was most useful to them; I remember several men who, with great advantage to themselves, had had scholastic careers; I have also known not a few whose training as medical men served them in good stead. If we were living in the days of Methuselah, training in these several directions and others might advantageously be recommended, for there is scarcely knowledge in any direction which will not help in the building up of the ideal dentist; but we may well be content, in framing the subjects for a qualifying examination, to restrict them to the present number and concentrate our efforts on that practical training which helps to make the good all-round dentist.

I have ventured in this brief paper to bring before you these suggestions—not dogmatically, but in the sincere conviction that it is along these lines that we must travel if we are to progress.

The feeling that the mechanical and operative branches are separate is widespread. I would ask if we have not done something to countenance it by our attempt to differentiate and to regard mechanical dentistry as something which, by an apprenticeship, can be learned apart from operative work.—*British Dental Journal.*

A PRACTICAL METHOD OF REMOVING LIVING DENTAL PULPS. By Dr. E. T. Loeffler. The word "practical," as you all know, means that which pertains to or is grounded by actual use and experience as contrasted with ideal and speculative. Method, on the other hand, means a general or established way or order of doing or proceeding in anything, or the means or manner by which such way is presented or is inculcated. Therefore, in using the expression, "practical method," I mean a way

or manner of doing things which the average practitioner can carry into effect with the facilities he has at hand.

Many of the so-called "practical methods," as given in our journals, have too much of an ideal nature and require so many special facilities that the average man will not make use of them.

The simplest, most efficient and painless method of removing the living dental pulp is as follows: Thoroughly cleanse the oral cavity by means of warm water, containing some antiseptic solution, using either syringe, hand or compressed air atomizer, in fact, any facilities the operator may have at hand. Then isolate the tooth by adjusting the rubber dam in every case in which that process is possible. Next carefully cleanse and disinfect all the exposed teeth by a 3 per cent solution of some preparation of H_2O_2. The object of these preliminary steps is to obtain as nearly as possible a clean field of operation.

Cases in which there is already an existing cavity are most conveniently treated by carefully removing all debris and decay without pain, if possible. Then treat the cavity for a few minutes with Dentalone, a saturated solution of chloretone in the essential oils, than which there seems to be no better preparation on the market. If the cavity happens to be proximal, the matrix and matrix-retainer should be adjusted so as to change it into a simple one.

A tablet containing 1-6 gr. cocain hydrochlorid and 1-300 gr. of adrenalin chlorid, as prepared by Parke, Davis & Co., should now be placed in the cavity and moistened with a drop of water. Upon this is placed a piece of unvulcanized rubber and forced into the cavity with a gradually increasing pressure; a short orangewood stick fitted to the opening and so adjusted that the patient can bring about a gradual and increasing pressure by means of the opposing teeth. Cases in which the pulp is already exposed will be ready in one or two minutes, depending upon conditions. If the pulp still continues to be sensitive, try a weak solution of cocain without any adrenalin, and then follow with a solution of adrenalin (1-1,000). Although I still maintain, with others, that there is some objection to the use of adrenalin, it enables one to completely remove the pulp at one sitting.

When there is no existing cavity, one may be made in the di-

rection of axis of the tooth, and just through the enamel, and the cocain and pressure applied as above indicated. Two or three applications may have to be made before the pulp can be exposed. The bur should be dipped in phenol or dentalone before using. Should the pulp still be slightly sensitive, make another application and keep up the pressure for about 40 seconds. The cavity should now be sufficiently enlarged with suitable burs so that free access can be had to all the canals. On account of the insensibility of the parts, great care should be exercised not to make any perforations. By means of barbed broaches, Gates-Glidden drills, Beutelrock drills and root-reamers, previously dipped in dentalone, the pulp may be thoroughly and completely removed. This part of the operation must not be slighted if you wish to avoid the trying ordeal of removing sensitive fibers at the next sitting.

H_2O_2, 3 per cent seems to be a most efficient drug for removing blood and debris from the cavity. The cavity is then flooded with dentalone, the excess removed, cotton inserted into the canals and pulp-chamber, and the balance filled with temporary stopping. This dressing should remain at least 48 hours, at which time the root canals may be filled in the usual way.

Should there be any soreness the treatment may be repeated and counter-irritants applied, aconite and iodin being a favorite one.

This method, if strictly adhered to, will give excellent results in at least 75 per cent of cases. Success will depend largely upon the following rules:

1. Completely remove all traces of the pulp at first sitting.
2. Dip all instruments in a germicide before inserting them into the pulp-chamber.
3. Never fill a root canal at the same sitting; it will give the tooth a better chance to recover from the shock.—*Dental Summary.*

[NOTE.—Adrenalin chlorid is of questionable value in the anesthetization of dental pulps; and alcohol or distilled water, to which a little sodium chlorid has been added, will remove the blood from the cavity without danger of discoloration. H_2O_2 decomposes the blood, but does not *remove it.*—EDITOR *Digest.*]

RESTORATION BY PORCELAIN OF THE LOWER ONE-THIRD OF A CENTRAL INCISOR. By Stephen Palmer, D.D.S., Poughkeepsie, N. Y. What to do; which plan of several would be the one most satisfactory to our patient and ourselves is the question which often confronts us as members of the dental profession, and it is one which taxes our utmost thought to decide. It was this question which came to the writer not long ago, and thus far he feels that his judgment was correct.

A father presented himself, accompanied by his son, age about fourteen years, with the full allotment of teeth in perfect condition, not affected by caries, and all other conditions perfect, but during a game of baseball had been unfortunately hit by a bat, which fractured one of the central incisors about one-third distance from the cutting edge, leaving a clean and perfect break, and not exposing or injuring the pulp in the least, therefore making it more difficult to decide whether to repair with a porcelain tip held in position by a platinum wire loop baked into the porcelain and anchored in the tooth or by a porcelain post crown, both of which would necessitate devitalizing and removing the pulp from the one tooth among a complete and well-nourished twenty-eight.

As the writer believes it to be our duty as dentists to preserve every pulp vital, if by any means in our power it is a possibility, the following operation was decided upon, perhaps the first of its kind, or at least so far as the knowledge of the writer extends.

The first step in the process was to grind the enamel and a very small portion of dentin from the labial, lingual and proximal surfaces about the depth of one-thirty-second of an inch, and extending about one-eighth inch distance from the end of the tooth, thereby forming a true and uniform shoulder and edge all the way around the tooth, and so shaped that the platinum foil matrix would draw freely. Following this a platinum foil was burnished to the prepared end, using every precaution to thoroughly burnish it into all angles. After removing I added and baked a thin layer of porcelain over the whole surface of the foil to stiffen it, when it was returned to the proper position on the tooth and the edges of the foil accurately burnished to the edge of the shoulder, thus securing a perfect joint. Again removing the cap a sufficient amount of porcelain of the correct shade was added to produce the contour, and after removing the matrix foil we had a complete all-porcelain

cap which, cemented in position, restored the fractured central to a perfect condition, with the pulp well protected, as the cap is also protective, like enamel.

After about one year, during which time the tooth has been without the slightest sensation to thermal changes, the cap is in perfect condition; and as I was very successful in selecting and mixing the shades, it is unnoticeable to the general observer, and it is the firm belief of the writer that it will serve the required purpose for years to come.

If in cases of this kind there is a possibility or probability that we may preserve the damaged tooth in a normal and vital condition, is it not worth the experiment? If dentists will equip their offices with a complete porcelain outfit and acquaint themselves with its workings and qualifications they will be repaid many times over for their expense and time by the satisfactory results and the gratefulness of their patients.—*Dental Brief.*

Does Meat Cause Cancer?—The ranks of those who regard excessive consumption of meat as the cause of cancer have been joined by an English physician, Dr. G. Cooke Adams, who is reported in the daily press as having just concluded a two years' study of this disease in Chicago. Says *The Medical Record* (New York, September 28):

"This is an old theory, one of the first, indeed, to be offered when investigators began seriously to search for a cause of the increase of cancer in modern times, but Dr. Adams varies it somewhat by the suggestion that it is the consumption of the flesh of diseased animals chiefly that leads to the development of cancerous growths. Some time ago Oldfield had something of the same notion, but his theory was that it was the flesh, not of diseased animals (the tuberculous, the actinomycotic, etc.), but of those which had been overfed, that favored the production of cancer. In other words, it was not autointoxication of the human, but rather that of the animal whose flesh was eaten, which gave the impetus to malignancy of cell growth. Dr. Adams' theory, if he is correctly reported, would seem to be of the same order—that the toxic principle, whatever that may be, causing the disease is present in the meat itself, and is not formed by an autotoxic process in the intestine or tissues of the consumer. Dr. Robert Bell of London holds the autointoxication theory, but does not regard meat as a special cause, except indirectly as leading to a more ready production of toxic material. Should the autotoxic theory prove to be correct, it may possibly be found that diseased meat differs from sound meat, and both from other foods, only in the fact that the elaboration of a cancer-producing substance from the former is a more rapid process and one requiring a smaller amount of the offending food."—*Literary Digest.*

The Dental Digest.

PUBLISHED THE LAST WEEK OF EVERY MONTH

At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

Editorial.

BEGIN WITH MERRY CHRISTMAS.

Of all the busy months in the year there is no one perhaps into which so much is crowded as the month of December. There is much of reflection as each one reviews, even though rapidly, the events of the year which have followed thick and fast as Father Time has rushed on, accelerating his speed more and more and making each year shorter than the last.

To every business man the first thought will naturally be, what have been the profits and losses of the year, for those inexorable figures in the ledger must tell the story, and upon the facts thus learned must future plans be based, and usually many changes be made. So also will the home life be affected by the balancing of these figures.

It will be found necessary in many a home to spell retrenchment, while others will take advantage of the prosperous times and be tempted to be more lavish in their expenditures in the New Year than in the past. The bane of our civilization is this struggle for wealth and the fact that so large a number live up to and beyond their means.

But what of us as a profession? As we review the past year, has it been satisfactory to us individually or otherwise? Have we made mistakes? Of course we have. Man learns through his mistakes; but it matters little if he profits by them and avoids the same in future. Someone has said, "Our mistakes are but the stepping-stones on which we rise to our higher selves."

As to our profession at large, we believe the prospect was never more hopeful. There has never been a time when there was more interest in the society meetings; when more men were interested in experimenting and investigating along various lines

and with greater success; when there was a better feeling among practitioners; more comradeship; more esprit de corps. And so, with this hopeful outlook, we wish you one and all a Merry Christmas and a glad, happy New Year. With Rip VanWinkle we say from our heart may you live long and prosper.

BROADEN THE HORIZON OF DENTISTRY BY ORGANIZATION.

That the profession of dentistry needs to be better organized from most of the local and state to the national societies is evidenced on every hand. But this fact has never been quite so forcibly brought to our attention as recently while taking a trip through one of the central states of the Mississippi Valley; during which it was the lot of the writer to be compelled to wait, while changing cars at the depot, at a certain city of perhaps 25,000 inhabitants, for about an hour; and during this time he chanced to pick up one of the city's daily papers—a small sheet of only four pages.

To his utter surprise there were found something like eight dental advertisements, only one of which was a modest, ethical card announcement. The medical ads were far more numerous and showed a condition among the medical practitioners equally as deplorable—not to say disgusting. Laying the paper aside, the writer wondered what must be the condition of dentistry in this city—a city, which, by the way, enjoys an enviable commercial reputation. It was not long, however, before something was known of the real condition; for the casual observation of the people about him showed the most glaring examples of the anterior gold crown that it has ever been his misfortune to see. There were perhaps fifty people in the waiting room, and from where the writer was sitting, without any extra effort to observe the mouths of those whom he could see, there were noticed six gold crowns on lateral incisors, four of which were in the mouths of intelligent appearing ladies. In this age of dentistry, when clinics are held so frequently and advanced methods of practice are demonstrated so thoroughly, there is absolutely no excuse for

the anterior gold crown or other dental monstrosities equally absurd.

The questions which naturally arise are: Wherein lies the remedy, or how can the conditions be improved? The unequivocal answer is for the more progressive element of the profession to get together and effect a better organization of the dentists of the state.

It is not our intention to say anything derogatory of the present State Society of this particular state, for it has been our privilege, on more than one occasion, to have been the guest of this society, and we know that it is far above the average. Neither is it in a boastful spirit that the assertion is made that in no town or city in the state of Illinois can there be found a similar condition to that which has been related. This is because of the present effective state organization. In the state of Illinois today dentists are working together, shoulder to shoulder and heart to heart, and under the influence of this close association is melting away, we hope, forever, the former jealousies, and in some cases, the hatred and animosities, which existed among and separated so many of the dental practitioners of the state. Because there are those among us who are yielding to the far too prevalent methods of deceitfulness, dishonesty and graft, is no reason why the more honorable and ethical element of the profession, who are in the vast majority, should swerve from their duty. In fact, this should be an incentive for the latter to labor more diligently for a better organization of the dental practitioners of their respective states, to the end that those who are now degrading the profession may see the error of their way, and may be given an opportunity to join the State Society and thus add their influence towards broadening the horizon of dentistry.

J. P. B.

Notices.

ADAMS-HANCOCK (ILL.) DENTAL SOCIETY.

At the annual meeting of the Adams-Hancock Dental Society, held at Quincy, Nov. 6, 1907, the following officers were elected: President, R. E. Tull, Carthage; Vice-President, J. B. Buehner, Quincy; Secretary, T. A.

Hartley, Warsaw; Treasurer, C. T. Hewes, Qunicy; Librarian, Warren L. King, Quincy. The next meeting will be held at Warsaw.

PENNSYLVANIA STATE BOARD OF DENTAL EXAMINERS.

The State Board of Dental Examiners of Pennsylvania will conduct examinations simultaneously in Philadelphia and Pittsburg, Dec. 10-13, 1907. For papers or further information applicants must address

DR. N. C. SCHAEFFER, Secy., Harrisburg, Pa.

NORTHWESTERN UNIVERSITY DENTAL SCHOOL.

The annual clinic of Northwestern University Dental School will be held at the Northwestern University Building, corner Lake and Dearborn streets, Chicago, on Tuesday, Jan. 14, 1908. A hearty invitation is extended to all graduates and ethical practitioners. G. R. PUFFER, D.D.S., Secy.

SOUTHERN ILLINOIS DENTAL ASSOCIATION.

At the annual meeting of the Southern Illinois Dental Association, held at Alton, Oct. 30, 1907, the following officers were elected: President, G. A. McMillan, Alton; Vice-President, W. E. Holland, Jerseyville; Secretary-Treasurer, H. L. Dickinson, Alton. The next meeting will be held at Alton.

ESSEX (MASS.) DENTAL CLUB.

The annual meeting of the Essex Dental Club was held at Ferncroft, Mass., Nov. 7, 1907, and the following officers were elected: President, M. E. Davenport, Beverly; Vice-President, William B. Laskey, Marblehead; Secretary-Treasurer, Frederick E. Jeffries, Salem; Librarian, Charles G. McGlew, Salem.

OHIO STATE DENTAL SOCIETY.

The forty-second annual meeting of the Ohio State Dental Society was held at Columbus, Dec. 3, 4 and 5, 1907, and the following officers were elected: President, C. I. Keely, Hamilton; Vice-Presidents, W. H. Whitslar, Cleveland; M. H. Fletcher, Cincinnati; Secretary, F. P. Chapman, Columbus; Treasurer, W. A. Price, Cleveland. Directors—C. R. Butler, Cleveland; L. L. Barber, Toledo; G. H. Wilson, Cleveland.

G. V. BLACK DENTAL CLUB CLINIC.

The G. V. Black Dental Club of St. Paul will hold its Annual Midwinter Clinic in February, 1908. It is the intention to make this meeting the most interesting and profitable of all that have been held.

A cordial invitation is extended to the members of the profession to attend and assist in making this meeting an unparalleled success. Dates and program will be published later. For further information address

R. B. WILSON, Secy., American Nat. Bank Bldg., St. Paul, Minn.

DANVILLE-CHAMPAIGN (ILL.) DENTAL SOCIETY.

The annual meeting of the Danville-Champaign Dental Society was held at Danville, Nov. 12, 1907, and the following officers were elected: President, S. W. Heel, Monticello; Vice-President, F. O. Sale, Urbana; Treasurer, H. E. Davis, St. Joseph; Secretary, George C. McCann, Danville; Librarian, H. P. Warner, Champaign. The next meeting will be held at Danville.

NATIONAL CAPITAL (D. C.) DENTAL SOCIETY.

At the regular meeting of the National Capital Dental Society, held at Washington, Dec. 7, 1907, the following officers were elected for the ensuing year: President, Chas. W. Cuthbertson; Vice-President, Wm. B. Daly; Recording Secretary, J. P. Devlin; Corresponding Secretary, J. W. Hollingsworth; Treasurer, W. F. Heyser; Librarian, C. H. Howland.

J. W. HOLLINGSWORTH, Cor. Secy.

ALUMNI ASSOCIATION OF THE CHICAGO COLLEGE OF DENTAL SURGERY.

The annual meeting of the Alumni Association of the Chicago College of Dental Surgery will be held in the college building, corner Wood and Harrison streets, Wednesday, Jan. 15, 1908.

It is hoped that there will be a large attendance, especially of graduates of the college.

T. L. GRISAMORE, D.D.S., Pres.
H. C. PEISCH, D.D.S., Secy.

ALUMNI ASSOCIATION MILWAUKEE MEDICAL COLLEGE DENTAL DEPARTMENT.

The second annual clinic and exhibit of the Alumni Association, Dental Department, Milwaukee Medical College, Marquette University, will be held in Milwaukee, Wis., Jan. 21 and 22, 1908. Preparations are being made for an excellent program.

Members of the dental profession are cordially invited.

EDWARD C. WACKLER, Secy.,
Pabst Theater Bldg., Milwaukee, Wis.

ODONTOTECHNIQUE SOCIETY.

The regular monthly meeting of the Odontotechnique Society will be held Thursday, Dec. 5, at the Elks' Club, 37 Greene street, Newark, N. J. The paper of the evening will be read by Dr. Thos. E. Weeks. (Subject to be announced.)

At the January meeting, Thursday, Jan. 2, Dr. D. A. Webb of Scranton will read a paper entitled "Malignant Growths of the Jaw; Fractures, Etc."

JOHN A. VOORHEES, Journal Correspondent.

SOUTHWESTERN TEXAS DENTAL ASSOCIATION.

The third annual meeting of the Southwestern Texas Dental Association was held at San Antonio, Nov. 16, 1907, and the following officers were elected: President, Julian Smith, Austin; Vice-President, J. H. Graham, San Antonio; Secretary-Treasurer, F. W. Smith, Austin. The next meeting will be held in Austin in February. F. W. SMITH, Secy.-Treas.

NORTHWEST MISSOURI DENTAL ASSOCIATION.

At the annual meeting of the Northwest Missouri Dental Association, held at Kirksville, Nov. 12 and 13, 1907, the following officers were elected: President, W. E. Green, Kirksville; Vice-President, W. T. Rutledge, Monroe City; Secretary-Treasurer, E. E. Bohrer, Kirksville. The next meeting will be held at Moberly.

INDIANA STATE BOARD OF DENTAL EXAMINERS.

The Indiana State Board of Dental Examiners will hold its next regular meeting in the State House at Indianapolis, Jan. 14, 15 and 16, 1908. At this meeting all applicants for registration in this state will be examined. For further information apply to the secretary.

F. R. HENSHAW, Middletown, Ind.

THE ST. LOUIS SOCIETY OF DENTAL SCIENCE.

The St. Louis Society of Dental Science will hold its annual meeting at the Jefferson Hotel, Jan. 21, 1908, at 2:30 p. m. Lecture on "The Life Work of Professor Miller," by Edward C. Kirk, D.D.S., Sc.D., Philadelphia. Discussion opened by Dr. N. S. Hoff, Ann Arbor, Mich.; Dr. Louis P. Bethel, Columbus, Ohio.

The annual banquet will be given at 7 p. m. of the same day in honor of Prof. Edward C. Kirk, Dean of the Dental Department, University of Pennsylvania, and Editor of "The Dental Cosmos." The speakers will be: Rev. Dr. Henry Stiles Bradley, Pastor St. John's M. E. Church, St. Louis; Hon. Arthur W. Sager, Circuit Attorney, St. Louis; Dr. Louis P. Bethel, Editor "The Dental Summary," Columbus, Ohio; Dr. Neville S. Hoff, Editor "The Dental Register," Ann Arbor, Mich.; Dr. Chas. H. Darby, St. Joseph, Mo.; Dr. F. G. Worthley, Associate Editor "The Western Dental Journal," Kansas City; Dr. W. L. Whipple, St. Louis; Dr. Burton Lee Thorpe, Associate Editor "The Dental Brief," St. Louis, Mo.

The profession are invited to attend both the lecture and banquet.

For reservation for same and other information address Dr. Richard Summa, Oriel Building, St. Louis.

W. L. WHIPPLE,
E. E. HAVERSTICK,
HERMAN F. CASSELL,
} Executive Committee.

D. O. M. LECRON, Pres.
C. O. SIMPSON, Secy.

INSTITUTE OF DENTAL PEDAGOGICS.

The fifteenth annual meeting of the National Institute of Dental Pedagogics will convene in the St. Charles Hotel, New Orleans, La., Dec. 31, 1907, and Jan. 1 and 2, 1908. The following program has been prepared by the Executive Committee. All teachers in dental colleges are respectfully requested to attend this meeting.

PROGRAM.

1. President's Address .....Dr. J. H. Kennerly, St. Louis, Mo.
2. Report of Commission on Nomenclature .....
.....Dr. S. H. Guilford, Philadelphia, Pa.
3. Recitation Teaching in Orthodontia.....Dr. Calvin S. Case, Chicago, Ill.
4. A Method of Teaching Technical Operative Dentistry.....
.....Dr. A. E. Webster, Toronto, Ont.
5. The Teaching of Prosthetic Dentistry.....
.....Dr. Walter M. Bartlett, St. Louis, Mo.
6. Teaching Operative Dentistry and Dental Pathology.....
.....Dr. Harry B. Tileston, Louisville, Ky.
7. A Method of Teaching Dental Ceramics.....
.....Dr. W. L. Fickus, Pittsburg, Pa.
8. The Didactic Teaching of Dental Anatomy, Embryology and Histology .....Dr. C. D. Lucas, Indianapolis, Ind.
9. Report of Master of Exhibits.....Dr. F. C. Friesell, Pittsburg, Pa.
10. Report of Master of New Teaching Facilities.....
.....Dr. N. T. Yager, Louisville, Ky.

B. E. LISCHER, Sec. and Treas.,
504 Humboldt Bldg., St. Louis, Mo.

LATEST DENTAL PATENTS.

868,964. Crown-pin, for dental work, Henry D. Bultman, New York.
869,035. Dental instrument, Wm. C. Wolford, Confluence, Pa.
869,175 Toothpick, Peter Gorut, Fulton Chain, N. Y.
869,191. Dental plate, Gordon W. Morgan, Salem, Va.
869,417. Stone guard for dental grinding tools, Frank W. Chandler, Valley City, N. D.
869,520. Dental impression pliers, Myron A. Robbins, Passaic, N. J.
869,562. Dental engine, James F. Hardy, New York, N. Y.
869,563. Handpiece for dental engines, James F. Hardy, New York, N. Y.
869,573. Toothpick machine, Wm. F. Hutchinson, Nyack, N. Y.
869,840. Dental engine, Winfield E. Hanson, Biddeford, Me.
869,993. Machine for boxing toothpicks, Simon S. Tainter, W. W. Tainter and G. P. Stanley, Dixfield, Me.
870,573. Instrument for introducing liquid medicament into teeth. Charles G. Myers, Cleveland, Ohio.
870,824. Handpiece for dental engines, James F. Hardy, New York, N. Y.
870,825. Angle attachment for dental handpieces, James F. Hardy, New York.

870,909. Dental articulator, George B. Snow, Buffalo, N. Y.
870,962. Manufacture of a new material for use in dentistry, Otto Hoffmann, Charlottenburg, Germany.
871,400. Combination dental bracket, George Hall, Lima, Ohio.
871,430. Artificial tooth, Joseph Morris, North Wales, Pa.

News Summary.

CHARLES R. WOLF, a well-known dentist of Pittsburg, Pa., died November 13, 1907.

H. ELLIOTT, a dentist of Cobden, Ont., met death by drowning November 12, 1907.

JEREMIAH REARDON, a dentist of Lawrence, Mass., died at Globe, Ariz., November 25, 1907.

THOMAS STEPHEN BEALE, a prominent dentist of Philadelphia, Pa., died November 22, 1907.

W. W. PERKINS, 80 years old, an old-time dentist of Baldwinsville, N. Y., died November 8, 1907.

HENRY W. YOUNG, a leading dentist of Wilkes-Barre, Pa., died from apoplexy November 14, 1907.

JAMES PEMBERTON, 50 years old, a dentist of Fall River, Mass., died suddenly November 17, 1907.

LAFAYETTE BUCKNER, for many years a practicing dentist of Shelbyville, Tenn., died November 16, 1907.

J. P. FLOOD, 69 years old, a prominent dentist of Streator, Ill., died from pneumonia November 9, 1907.

N. W. RATLIFF, 35 years old, a dentist of Fairmount, Ind., died at League City, Tex., November 18, 1907.

J. B. MARTELLE, 70 years old, a dentist of Burlington, Iowa, died from heart disease November 7, 1907.

JOSEPH SHUTE, 63 years old, a dentist of Haverhill, Mass., died from heart failure November 21, 1907.

JEREMIAH FISKE, 83 years old, a dentist and resident of Clinton, Mass., since 1849, died November 19, 1907.

M. H. LAMOREE, for fifteen years a dentist of Grand Rapids, Mich., died at Otsego, N. Y., November 21, 1907.

JAMES REYNOLDS, 60 years old, a prominent dentist of Eau Claire, Wis., died of heart failure November 15, 1907.

J. A. STIPP, 62 years old, a prominent dentist of Toledo, O., for more than twenty-five years, died December 1, 1907.

D. W. AINSWORTH, an old-time resident and for many years a prominent dentist of Ware, Mass., died November 24, 1907.

R. H. McDONALD, a young dentist of Buffalo, N. Y., died at the home of his brother at Clarksburg, Ont., November 16, 1907.

THOMAS B. SHUMWAY, 68 years old, a dentist of Boston, Mass., died at his home in Plymouth, after a long illness, November 6, 1907.

MRS. JENNIE MORT WALKER, well-known in New Orleans for her earlier literary efforts and as an authority on dentistry, being a contributor to publications dealing with dentistry, died in that city November 7, 1907.

FIRES.—Dr. N. F. Foote, Tupper Lake, N. Y., Nov. 18; loss, $3,300.—Dr. Lamine, Mitchell, S. D., Nov. 16; damage to furniture and fixtures.—Dr. Frann, Ardmore, Okla., Dec. 1; loss, $500.

BANQUET TO DR. LOOMIS P. HASKELL.—Loomis P. Haskell of Chicago was tendered a banquet by the faculty and officers of the State Dental College of Texas at Dallas, Nov. 16, 1907.

SOCIABILITY.—Nothing so dwarfs a man in any walk of life as isolation; nothing so broadens him as frequent, if not constant, intercourse with those engaged in the same occupation.—E. K. BLAIR, *Dental Review.*

THE Ransom & Randolph Company of Toledo, Ohio, has sustained a great loss in the death of its two senior members. Mr. J. R. B. Ransom died at San Francisco, Cal., on Dec. 17, and Mr. Thaddeus F. Randolph at Toledo on Dec. 20, 1907.

A WARNING TO DENTISTS.—Judge Snider of Hamilton, Ont., Nov. 11, rendered a judgment for $65 to Austen Carty, who sued James Henry of Toronto, proprietor of the Hamilton dental parlors, for failing in his promise to extract teeth painlessly. Carty had asked for $200 damages.

ACCIDENTS.—Dr. O. W. Swicard of Walnut Ridge, Ark., met with a peculiar accident recently. While extracting a tooth, the molar slipped from the forceps, struck his glasses, which were shivered, and filled one of his eyes with broken glass, which may deprive him of the sight of the injured eye.

AN ANNIVERSARY.—Dr. W. T. Magill of Rock Island, Ill., celebrated the fiftieth anniversary of his entering the practice of dentistry Nov. 23. Members of the Rock Island County Dental Society gathered at his home to congratulate him on the event and presented him with a leather rocking chair. Letters of congratulation were received from prominent dentists throughout the state.

HABITUAL USERS OF PERUNA.—In the *Lancet-Clinic,* August 3, 1907, W. H. DeWitt reports having, within the past year, two patients suffering from chronic alcoholism due to the habitual use of peruna. The second patient suffered from extreme nervousness and insomnia, and denied using stimulants to excess, but admitted taking five or six drinks of peruna daily for two years. DeWitt comments on the explanations given by the manufacturers of peruna as to the incorporation, in this "hypothetical cocktail," of a laxative. "At the solicitation of friends" would more correctly read, "at the behest of Uncle Sam." The fact that the press of the country

aids and abets the traffic in this nostrum is cause for caustic criticism on the part of Dr. DeWitt.—*Jour. Amer. Med. Assoc.*

DENTAL SCRAP BOOK.—The Dental Scrap Book, "published now and then," has just made its initial bow under the guidance of its editor, Dr. Charles A. Meeker of Newark. "This pamphlet," says Dr. Meeker in the publication's salutatory, "is printed and sent out to stimulate interest in both the local and the state society. It is the desire of the editor, it is explained, to have all dentists contribute to this pamphlet and to issue the pamphlet as often as once a month.

TUBERCULOSIS FROM DECAYED TEETH.—The *American Journal of Clinical Medicine* notes that when glands of the neck are the site of tuberculous enlargement not only the tonsils but also the teeth should be examined. Very often a tubercular adenitis acts as the cause of the glandular enlargement, especially of those glands anterior to the sternomastoid. Removal of the buccal irritation will sometimes cure the adenitis, so that a disfiguring operation will not be needed.—*Medical Times.*

MEMORIAL FOR LATE WILLOUGHBY MILLER HELD AT BERLIN UNIVERSITY.—A memorial meeting was held at the Berlin University, Nov. 24, in honor of the late Willoughby Dayton Miller, the American dental surgeon, who had been a professor of the university for twenty-two years. A year ago Professor Miller resigned to accept the deanship of the Dental Department of the University of Michigan, but he died at Alexandria, Ohio, from an operation, before beginning his new duties.

ROBBERIES.—Burglars entered the office of Dr. H. D. Moorman of Aurora, Ill., Nov. 11, and relieved him of gold amounting to $50.—Dr. Coffey's office, Wheaton, Ill., was robbed of instruments and material to the value of $60 Nov. 8.—Drs. Dalbey and Adkins, Elgin, Ill., lost gold filling material and crowns amounting to $40 Nov. 18.—Over $50 worth of gold and cash was taken from the office of Dr. R. C. Ross, Houston, Tex., Nov. 4.—The office of Dr. F. C. Hanson, Racine, Wis., was robbed of gold to the value of $25 Nov. 19.

AMPUTATION OF DEAD ROOTS OF MOLARS IN THE PREPARATION OF BRIDGE ABUTMENTS.—Let us suppose the bicuspid teeth and the second and third molars on one side of the maxilla have been extracted, but that the first molar is still in position, with the palatal root badly necrosed, and the vitality of the pericementum completely destroyed, owing to suppurative inflammation. In addition, resorption of the alveolus having been very pronounced, there is no longer any attachment to the surrounding tissue; in other words, the root is absolutely dead. Are we justified in extracting such a tooth?

In the case cited the entire palatal root should be amputated, for we cannot hope to correct such a pathologic condition by medicinal treatment alone; and when this is accomplished suppuration will invariably cease almost immediately, and the remaining roots will become firm in their sockets, retain the tooth rigidly in the process, and regain a usefulness

that is nothing short of miraculous in the eyes of the patient. What a fatal mistake it would have been to have removed such a tooth, for when the overhanging walls are trimmed down so as to parallel the remaining roots, you will have a posterior support for your bridges that will give very gratifying results.—FRANK E. LOGAN, *Dental Register.*

NOURISHMENT.—The number of people who do not get sufficient nourishment is large, not because they have not the means to procure the nourishment, but because they are incapable of taking it, either from lack of appetite or lack of the power of digestion or assimilation. In order to eat well one must have sufficient rest and sufficient life in the open air.—*Journal of the Outdoor Life.*

DR. J. L. WHINERY WILL RECOVER.—Dr. J. L. Whinery, a prominent dentist of Marshalltown, Ia., who at the National Dental Association convention held at Minneapolis last summer submitted to a clinic removal of a molar, resulting in poisoning from cocain, and who underwent an operation for tumor of the brain at a Rochester (Minn.) hospital, has been removed to his home. A later examination of his brain developed that he was suffering from a clot on the brain. His condition gives promise of complete recovery.

PREPARATION OF INSTRUMENTS.—Formerly, I took all the precautions necessary for thorough sterilization by boiling in water and by dry heat in a sterilizer; these extra precautions I found resulted in destroying instruments and did not improve my statistics. I long ago (ten years) returned to cleansing my instruments in diluted alcohol (alcohol ℥i, aquæ destillata ℥iii); after immersing them in this solution for five minutes they are then carefully dried with sterilized gauze.—D. W. GREEN, M.D., *Jour. Amer. Med. Assn.*

PREVENTION OF TOOTH DECAY.—Low discusses briefly the report of the committee on scientific research of the New York State Dental Society, in which is recommended the administration of potassium sulphocyanate in one-grain doses, before retiring at night, for the prevention of tooth decay. This commission found that in mouths where rapid and general decay of the teeth exists, potassium sulphocyanate is absent, whereas this salt is present in large quantities in the mouths of individuals whose teeth are immune to decay.—*Buffalo Medical Journal.*

MARRIAGES.—Joseph Tormey, a dentist of Mount Carmel, Ill., was married to Miss Nancy Conley of Covington, Ky., Oct. 29.—Charles A. Street, a dentist of Austin, Ill., was married to Miss Ellen Moore of Chicago Dec. 3.—J. G. Schermerhorn, a dentist of Flora, Ind., was married to Miss Sue Raber of Rockfield Nov. 12.—George R. Lindsay, a dentist of Grand Valley, Colo., was married to Miss Hattie Tilley of Frederickton, N. S., Nov. 10.—Louis C. Webber, a dentist of Muskegon, Mich., was married to Miss Janet M. Rodgers, also of Muskegon, Nov. 26.—A. B. McKeehan, a dentist of Carthage, Mo., was married to Miss Olive Black of the same place Nov. 13.—H. M. Failing, a dentist of New York City, was married to Miss Loretta

Dievendorf of Sprakers Nov. 15.—Asa E. Severance, a dentist of Milwaukee, was married to Miss Sophie Kah, also of Milwaukee, Nov. 7.—William J. Philips, a dentist of La Crosse, Wis., was married to Miss Pearl Smith of the same place Oct. 29.—H. J. Stark, a dentist of Oaxaca, Mex., was married to Miss Mockett in November.

FATALITIES.—A nine-year-old boy of Midway, Pa., died Nov. 15, the result of having some teeth extracted a few days previously.—A man in Monroe, Mich., dropped dead Dec. 2, after returning from a dentist's, where he had had a tooth extracted.—A woman in Pontiac, Mich., died Nov. 19 from the effects of blood-poisoning resulting from an abscessed tooth.—A woman in Chattanooga, Tenn., died in a dentist's chair under the influence of chloroform while having a tooth extracted in November.—A woman in Pottsville, Pa., died Nov. 25, the result of having a tooth drawn.

VALUE OF THE MICROSCOPE.—Regarding the subject of the microscope in differentiating between malignant and benign affections: While I do not want to ignore or decry the value of microscopic work, yet so far as my study has enabled me to go, it seems to me that the position of the microscope in reference to the question of physical diagnosis is now simply that of a help; that it is not absolute in its findings, which should be viewed only as corroborative of the previously conceived knowledge based upon rational clinical observation.—J. Y. CRAWFORD, D.D.S., *Dental Cosmos.*

GOLD INLAYS.—Some of the advantages claimed for gold inlays are as follows:

1. More certain of restoring the proper contour and contact point.
2. More perfect reproduction of the fossæ, grooves and cusps.
3. Less thermal conductivity, caused by the cement which also seals the cavity.
4. The adhesiveness of the cement which supports frail walls.
5. No bruised enamel walls, due to hard malleting.
6. Saves the patient and makes easier work for the dentist.—G. W. DITTMAR, D.D.S., *Dental Review.*

A PRECAUTION BEFORE OPERATING.—The use of alcohol before applying the rubber dam cannot be urged too strongly. Accumulations heavily laden with bacteria are found in the mouths of most patients, about the necks of the teeth and at the gum margin. If the dam is applied without removing and destroying the germs in these accumulations, infection of the gum is very often the result, and many cases of pyorrhea might be traced to such negligence. It should also be used to wipe the tooth off after the dam is applied, as the mucus provides an unclean surface over which to work, and I think hand instruments are less inclined to slip when used upon a tooth which is thoroughly cleansed of mucus and other accumulations found there. If a ligature be used, as is generally done, it is almost sure that some irritating substance will be forced beneath the gum; if you do not use the ligature, the rubber will adhere very much more tenaciously to the tooth when cleansed with alcohol.—J. F. WALLACE, *Dentist's Maga-*

zine. [The use of an antiseptic spray before adjusting the dam is also suggested.—EDITOR, *Digest.*]

YOUNG MEN! TAKE NOTICE.—Are young men interested quite as much as their obligations demand in prescription-writing? They ought to have this knowledge; they should be expected to write prescriptions. There are exceptions, but the large majority fall short. And, so it seems to me, in regard to other studies—say, anatomy, chemistry, etc.; they look upon what they get of these studies as something quite unnecessary, and are too well satisfied if they can be fairly skilful in mechanical work, and have just enough of the scientific studies for decoration and to pass muster.—DR. THOS. FILLEBROWN, *Dental Cosmos.*

CASES WHERE GOLD FOIL IS NOT INDICATED.—I want to emphasize the places where gold foil is not indicated. In those cases in which the teeth are loose in their sockets and where the force of packing gold will disturb the pericemental membrane, I would use cement or inlays. The next class of cases would be those where we have a great tendency toward decay, where under almost any kind of filling decay will recur. We have all had such cases now and then where we did not expect gold fillings to last for any length of time. In those cases I would substitute some plastic material for gold.—J. N. CROUSE, D.D.S., *Dental Review.*

CAUTERIZATION OF SINUS IN CHRONIC ABSCESSES EITHER USELESS OR VALUELESS.—In the treatment of chronic abscess with a sinus the forcing of any medicine through the tract under pressure seems to me to be bad practice. If much of the pericemental membrane about the end of the root has been destroyed, the medicine will not effect a cure; and if the membrane is intact, such medication is unnecessary, as the case will heal as readily without it. Hydrogen dioxid does much more harm than good in the treatment of these cases by forcing the infection deeper into the tissues as it expands.—A. D. BLACK, *Dental Review.*

FREE DENTAL WORK BOON IN SCHOOLS.—Interesting statistics are given in the first report of the dental clinic of the Children's Aid Society covering the first four months of the clinic's work at the West Fifty-third Street Industrial School [New York]. Realizing that one of the most prevalent causes of the poor health and deficiency in studies of school children is that of poor teeth, several of the leading dental surgeons of the city met at the City Club on Jan. 22 last and organized the clinic in an attempt to eradicate the trouble in the society's twenty industrial schools, eight lodging houses and temporary homes, and in the neighborhoods which surround these centers. With Dr. J. Morgan Howe as president, Dr. Robert L. Wheeler as vice-president, and Dr. Arthur E. Merritt as secretary, a staff of nine consulting dental surgeons was organized. These men will give their services gratuitously. Every one of 394 children examined required some form of dental treatment, 1,264 cavities being found, and it was necessary to extract 214 teeth. About fourteen cases are attended to each day. Neighborhood work along the lines

followed out by the society's visiting physicians and nurses is to be instituted and as rapidly as possible the work will be extended so that the 15,000 pupils in the various schools will not only be entitled to free treatment but will be watched over by the teachers and required to have any dental defects immediately remedied. Already the effect on the standard of health in the school has been noticed.—*New York Telegram.*

Good Advice for the Investigator.—You need only to read the literature of any profession carefully to find that some articles which represent research work were undertaken by men who knew what they were going to find before they made the first experiment, and there has been nothing which has held back professional advancement more than that kind of research. Everyone who undertakes a line of experimental work has ideas as to what he thinks he is going to find; but if he is an investigator, he must be free from prejudice; he must be willing to weigh everything, and be able to see the results he gets, even if they are not the ones he expects.—F. B. Noyes, *Dental Review.*

Poison in Cigarettes.—Amerson maintains that the poison in cigarettes is manufactured in the cigarette as it is smoked. He says that in the smoking of the cigarette carbon monoxid is formed, and the inhalation of this gas is what does the harm. The smoke from cigars and pipes is so strong that it cannot be inhaled. This is not true of the cigarette. Amerson says that he has never known or heard of a cigarette smoker being hurt who did not inhale the smoke. He thinks that the evidence is conclusive that the poison in cigarette smoking is due to the smothered fire forming carbon monoxid, and this being inhaled, little by little, kills the smoker.—*Jour. Amer. Med. Assn.*

Smile.—

Smile, once in a while,
'Twill make your heart seem lighter;
Smile, once in a while,
'Twill make your pathway brighter;
Life's a mirror, if we smile
Smiles come back to greet us;
If we're frowning all the while,
Frowns forever meet us.

—Nixon Waterman.

New Operation for Cleft Palate.—Starr does a modified Langenbeck operation. The first lateral incision is carried well out to the alveolar margin of the hard palate, beyond the anterior extremity of the cleft. The mucoperiosteum is then denuded, and by snipping the palate aponeurosis from the posterior margin of the hard palate the flap is freed from its bony attachments. The same is done on the other side. The edges of the flaps are then paired and the flaps sutured with horse hair, commencing at the anterior angle of the wound. An aluminum splint is wrapped around these flaps and fixed with a few sutures. The splint is left in for

eight or nine days, and the stitches are then taken out. The splint relieves the tension on the sutures, prevents the patient sucking the stitches, and minimizes the danger of infection from the mouth.—*Jour. Amer. Med. Assoc.*

DR. GUERINI'S HISTORY.—The importance and value of dental art and science as a humane service is well recognized, but we are so accustomed to view this question from the modern standpoint that we, generally speaking, overlook the immense work done by our predecessors, reaching far back in unbroken line to the mists of antiquity. It was they who laid the foundations upon which modern dentistry has been built, and no man can peruse the record of their efforts as set forth in Dr. Guerini's book without developing a higher appreciation of their work and a keener realization of the worth and dignity of the calling which they in common with ourselves followed.—DR. CHAS. MCMANUS, *Proceedings Federation Dent. Internationale.*

CHANGED HIS MIND.—I desire to rescind the statement I made last year in my paper before this body apropos of pulp mummification. From a more extended experience with this method and close observation, I am now prepared to say that while this sort of treatment will keep the tooth quiet for a year or two, at the end of that time, when the antiseptic properties of the drugs are exhausted, you may expect to have your patient return to you with the tooth canals putrescent and requiring further treatment. This may not be true in some sections of our country, but in malarial districts I not only find this to be the case, but I have considerable trouble in devitalizing pulps by arsenical applications.—W. A. LOVETT, D. D.S., *Items of Interest.*

POST-EXTRACTION TREATMENT.—

℞ Orthoform,
Europhen, aa ʒ j
Liquidi petrolati, q. s. to make a paste. —M
Sig.—As directed.

You will get much benefit from this, especially country dentists, where you have to do a great deal of extracting, in allaying the pain after the extraction; if you have separated the process, or if the process is attached to the cementum of the root; or if you have had to go down and expose the process more or less; in any of those conditions from which you have severe pain you can stop that pain almost like magic by its use. Now, it is claimed by some that orthoform is a disinfectant. It is not a good disinfectant, but is an excellent local anesthetic. You can prolong the anesthetic effect if you add europhen. Europhen is a substitute for iodoform. It is an insoluble product, which, when it comes in contact with water, gradually gives off iodin. Combining these two and adding to that liquid vaselin makes an oily paste. After drying the exposed part apply the oleaginous paste, and you can control the pain. You do not need to be afraid; if the patient lives in the country and cannot come in handily, and you think the pain will not stop by

the time the anesthetic effect has passed away, you can give him some of the paste and let it be applied personally. It must be applied to an abraded surface.—J. P. BUCKLEY, *Dental Review.*

MULTIPLE WARTS.—Cooper (*British Medical Journal*) reports the cure of multiple warts by taking limewater internally. He came upon this accidentally by taking limewater, a wine-glassful before meals, for digestive disturbances. At the end of two weeks a wart on his thumb which had resisted local treatment disappeared. He tested other cases with marked success. The warts generally disappear in from four days to six weeks. He administers it in milk. Hall reports in the same periodical that warts may be cured by active purgation extending over two months. Magnesium sulphate and aloin have both been tried with success. In one case reported there were 367 present on one hand and wrist alone.—*Mobile Medical and Surgical Journal.*

PROTECTION FOR THE DENTIST AGAINST SPECIFIC INFECTION.—Should the operator inflict even a trivial scratch on himself with an instrument which has become infected by a specific mouth, and which has not been properly disinfected, the result may be highly disastrous. The great advantage of the use of the rubber dam, so far as the patient is concerned, has been already pointed out, but it is when dealing with a mouth which it is known is likely to prove an active source of infection that the protection to the operator is likewise equally great.

If, while operating on what is known to be a dangerous mouth, the dentist has the ill-luck to cut his finger with an elevator or other instrument, as has happened before now with the worst results, what can be done? Until a year or so ago practically nothing.

The published experiments of Metchnikoff and Roux show that it is possible to cause abortion of the chancre following inoculation of syphilitic virus on the eyelid of a chimpanzee, by carrying out mercurial inunction less than one hour after the infecting contact—a curious point being that a solution of sublimate has not the same protective action. The ointment used in the prophylactic process is composed of ten parts of calomel to twenty parts of lanolin.

But a more important question remained, viz., whether what was the case with the monkeys would be the case with man. Many persons aware of these researches offered to allow themselves to be inoculated. Dr. Metchnikoff chose a young medical student, the grandson of an eminent surgeon, who was preparing his thesis on the prophylaxis of syphilis. He had neither hereditary nor acquired taint of the malady. He was inoculated in the presence of Dr. Queyrat of the Cochin, Dr. Saboureau of the Pitié and Dr. Salmon of the Pasteur Institute. Three scarifications with the scalpel were followed by the introduction of the virus. An hour later the inoculated spots were rubbed with the calomel ointment. The same thing was done with a monkey. Neither man nor monkey suffered any evil effects, whereas other monkeys, inoculated at the same time but not treated with the ointment,

contracted syphilis. The experimenters discovered, however, that in the case of a monkey the ointment must be applied within twenty hours after inoculation, as otherwise the infection declares itself. Dr. Metchnikoff affirms that if the time limit is respected, immunity is complete. He has since published letters from the three specialists above mentioned, affirming that the young man inoculated showed—more than three months later—no trace of syphilis, and that he had never had it.—(*Dental Surgeon*)—*Dental Cosmos.*

DISSERTATION ON DENTISTRY.—In his speech at Cairo, Ill., Mr. Roosevelt said: "I think that the excellent people who have complained of our policy as hurting business have shown much the same spirit as the child who regards the dentist and not the abscessed tooth as the real source of his woe." Referring to this statement the *Wall Street Journal* says: "The modern dentist in operating on an abscessed tooth does not frighten the patient by telling him how bad it is. Nor does he ordinarily extract the tooth in order to stop the suppuration. He applies scientific methods of painless dentistry." And the *New York World,* struck with the same presidential remark, says: "But what is the child to think if the forceps keep slipping and the dentist fails to pull the tooth?"

TREATMENT OF DENTAL HEMORRHAGE.—The severity of dental hemorrhage depends on a series of factors, local or general in character. The local are: Congestion of the gingival and periosteal tissues; degree of traumatism inflicted, and nature of the anesthetic used. The general or systemic predisposing causes are: Idiosyncrasy, age (extreme youthfulness or old age), such pathologic states as cachexiæ, disturbances of the liver, hemophilia, purpura, leukemia, cardiac affections, etc. Hemorrhage is either primary or secondary. In the former the patient is under the immediate control of the operator—who should not leave his patient—until the hemorrhage has been completely arrested. Secondary hemorrhage may occur at variable periods after the extraction, inasmuch as the loosening of the clot may arise from an almost infinite variety of causes, i. e., mastication, cough, sneezing, and passive vasodilatation, following intense vasoconstriction after an injection of adrenalin. Some such hemorrhages have been known to occur fifteen hours after extraction, and to recur several hours after they have been arrested.

The flow of blood from an alveolus is a capillary hemorrhage, and the best hemostatic treatment is the tamponing of the wound with cotton. As to medicinal agents, a great many have been recommended. Adrenalin chlorid in solutions of 1:1,000 is a very powerful hemostatic, but the intense vasoconstriction which it causes is followed by a passive vasodilatation. This after-effect is especially serious when it occurs as the result of having added the adrenalin to the cocain solution which was injected prior to performing the extractions. It happens under these circumstances that while the flow of blood is insignificant immediately after the operation, the secondary hemorrhages several hours afterward are, as a rule, very profuse. The local application of adrenalin, however, is not

conducive to secondary hemorrhages when the agent is used to arrest a primary flow of blood. Intensely hot water is a good hemostatic, especially in the case of hemophiliacs, inasmuch as blood having an insufficient amount of fibrinogen coagulates at a temperature of 106° F. Iron perchlorid is an active coagulating agent in solutions of one to twenty per cent. Tampons saturated with the latter agent should be squeezed to remove any excess of the agent before applying it to the alveolus. Chloroform water in saturated solution (2:100) applied hot, serum-gelatin, hydrogen dioxid, antipyrin, etc., have all been used in the effort to arrest dental hemorrhages.

If the tamponing with cotton should prove inefficient, the addition of tincture of benzoin, sandarac, or collodion to the tampon will render the packing almost water-tight. In the case of hemophilia, seldom observed after the age of 22, the administration of calcium chlorid—thirty to sixty grains per day—has given very satisfactory results.—Dr. M. Guibaud, *Dental Cosmos.*

Dilute Hydrochloric Acid an Aid in the Amalgamation of Dental Alloys.—I do not think you can properly amalgamate alloys unless you use an acid aqueous solution in the mixing. This point was given to me by the late Dr. Clapp of Boston some seven or eight years ago, and I have since employed the following method: Take hydrochloric acid, one part, and twenty parts of water; place the mercury in the mortar and pour on a sufficient quantity of alloy; then cover that with the acid solution, and you will be astonished to find how quickly the alloy will amalgamate. At the same time the dross is removed, and perfectly clean amalgam will be the result. After amalgamating it thoroughly, wash it off in the mortar with clear water, and then, drying it on a napkin, you have a very clean alloy, and one that keeps bright in the mouth.—G. A. Maxfield, *Dental Cosmos.*

Silver Wedding Anniversary of Dr. L. C. Bryan.—Dr. L. C. Bryan of Basel, Switzerland, who has practiced in that city since September 1, 1882, was with his wife, formerly Miss Atwood of Boston, the recipient of several silver tokens of friendship and appreciation, while flowers and telegrams of congratlation were sent from admirers in various countries of Europe, on the occasion of their silver wedding anniversary in September last. Among others was a magnificent silver table decoration presented by a number of dentist friends, engraved with the donors' names under a suitable dedication.

Dr. Bryan is an honorary member of the National Dental Association and has been an honorary president or vice-president from Switzerland of most of the International Dental Conventions and Congresses for many years past.

Illegal Practitioners.—A dentist of Redlands, Cal., who has been practicing dentistry for forty-eight years, was arrested Nov. 20 on the complaint of a woman detective in the employ of the State Board of Dentistry, charged with practicing his profession without a license. He was released under a $50 bond pending the trial of the case. It is declared that several Redlands dentists, who have not the practice of the accused, made charges against him before the State Board, and in this way the woman

detective was placed on his trail.—A dentist of Los Angeles, Cal., who claimed he had but recently arrived there and had not yet taken the examination before the State Board, was arrested Nov. 8 for practicing without a license.—A dentist of Columbus, O., was arrested Nov. 22, at the instance of the Secretary of the State Board, on the charge of practicing dentistry illegally. This is the second time he has come in contact with the State Board on this charge. About a year ago he was prosecuted in Cleveland.

EXAMINING BOARD AFFAIRS.—The new dental law of Connecticut requires assistants to be licensed in the same manner as regular operators. It also provides that all unlicensed assistants who were actually employed in performing operations in the office of a registered or licensed dentist on Jan. 1 of the present year, and who shall have registered their names with the dental commissioners prior to Oct. 1, 1907, "may perform dental operations on patients in the office of a licensed or registered dentist and under the immediate personal supervision of such registered or licensed dentist, but not otherwise." The clause that is arousing the greatest discussion is the one "under the immediate personal supervision," which would seem to admit of a number of interpretations. Thus it could be questioned whether an assistant could perform operations in the absence of his chief or in a separate room. As a result the commission has laid the question of interpretation before Attorney-General Holcomb, who has rendered the following opinion: "A combination of the words 'immediate personal supervision' limits the operations of the registered unlicensed assistant to such as are carried on in the office and presence of the supervising dentist, and could not lawfully be carried on or performed in the absence, though temporary, of the registered or licensed supervising dentist. The manifest intent is not to allow a registered unlicensed assistant to perform dental operations except under such immediate direction of a licensed or registered operator as to make the operation practically that of a licensed or registered operator."—Members of the State Board of Iowa recently called on the Board of Police Commissioners with a view of enlisting the police in a campaign against individuals who are practising dentistry without being registered. A number of dental students at the various colleges, it is said, are in the habit of practising dentistry and charging patrons whatever they will give for the service. As many of the students are not qualified to practice, and their work has frequently resulted in their patrons being not treated properly, thereby causing a great deal of complaint, the State Board has resolved to take up the matter. The penalty for practising without being properly registered is a fine of $50 to $300 or a term of imprisonment not to exceed six months.—E. D. Brower of Le Mars, Iowa, Secretary of the State Board, went before the executive council recently for authority to draw money from the state treasury for the expenses of the board. The board has turned in about $1,700 to the state treasury, and on application to draw upon it to pay expenses found that a legal question intervened. The state treasurer decided that he was powerless to pay out funds from the general revenue fund,

into which the rental fund went, without statutory authority, and he claimed that the law was not broad enough to permit it. Dr. Brower presented the matter to the council and it has been taken under advisement. It is purely a question of interpretation of the law.—Governor Johnson of Minnesota has appointed Dr. R. W. Berthel of St. Paul and Dr. G. H. Todd of Lake City, members of the State Board. Dr. Berthel succeeds Dr. F. H. Orton, also of St. Paul.—At a meeting of the Nebraska State Board, held Nov. 21, the following officers were elected for the ensuing year: President, J. H. Wallace, Omaha; Vice-President, C. S. Parker, Norfolk; Secretary, H. C. Brock, North Platte; W. T. Smith of Geneva was elected delegate to Boston to represent the Nebraska Board at the national meeting of state boards.—At the November meeting of the Oregon Board five out of fourteen candidates were successful in passing the examination. The State Dental Society, the City Dental Society (Portland) and the State Board have resolved to begin a crusade against illegal practitioners. For the purpose a fund of $5,000 has been pledged and a systematic plan of operations is to be inaugurated at once. Dr. J. M. Yates of Portland, a member of the board, said: "We are informed that between 50 and 100 dentists are practicing in this state without holding certificates, and we propose either to require them to come before the board and comply with the state law or compel them to stop."—At the initial meeting of the State Dental Board of Oklahoma, held in Guthrie, Nov. 21, a rule provided in the constitution was promulgated requiring all dentists who have taken up their residence in the Indian Territory section of the new state since June 16, 1906, to pass examinations before securing certificates. The exceptions to the order are all graduates. The board organized by electing: President, W. W. Bryan, Claremore; Secretary, A. C. Hixon, Guthrie; Treasurer, F. C. Seids, Perry. The other members are M. W. Murray, Poteau, and A. E. Bonnell, Muskogee.—Governor Crawford of South Dakota has appointed Ernest H. Wilson of Miller a member of the board to fill the vacancy caused by the resignation of C. W. Stutenroth of Watertown.—At the November meeting of the Washington Board only 14 out of 53 candidates were successful in passing the examination. Dr. E. B. Edgars, President of the Board, is quoted as saying: "The showing at this month's examinations is the poorest in the history of the state. The dental schools are becoming commercialized and are degenerating into diploma mills. It is disgraceful that out of more than a half hundred graduates of supposedly reputable schools only fourteen should be able to pass an ordinary practical and theoretical examination in dentistry. Graduates of the best town schools fared equally bad with those of lesser schools."

VOL. XIII. DECEMBER, 1907. No. 12

The Dental Digest

A MONTHLY SUMMARY OF DENTAL SCIENCE DEVOTED TO THE PROGRESS OF DENTISTRY.

CONTENTS.

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J. N. CROUSE, D. D. S., PUBLISHER.

J. P. BUCKLEY, PH. G., D. D. S., EDITOR.

2231 PRAIRIE AVENUE, CHICAGO.

$1.00 PER ANNUM IN ADVANCE. SINGLE COPIES, 10 CENTS.

Entered at the Post Office, Chicago, Ill., for transmission as second class mail matter

TO DR. J. N. CROUSE, PUBLISHER OF

THE DENTAL DIGEST

2231 Prairie Avenue, CHICAGO

Please forward the **Dental Digest** to me monthly for the year of 1908, for which find enclosed $1. Please continue sending the journal until otherwise ordered.

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(Dec., 1907.)

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In this day and age it is unusual and difficult to get something for nothing, but that is practically what you do when subscribing for the DENTAL DIGEST, as the dollar which you pay does not begin to equal the value which you receive.

The DIGEST each month contains original articles of the highest standard, added to which is the department of digests, giving the best of all matter appearing in other dental journals, both domestic and foreign. Still further is the news summary, a monthly feature affording a resume of all news and scientific items of interest to the profession and collected throughout the country. Such a journal is yours for 8 1-3 cents per month. Can you afford to be without it?

Subscriptions Commence Now. Send Yours.

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LISTERINE TOOTH POWDER

A fourth of a century of continued, satisfactory employment of Listerine has demonstrated to many who have used it during this entire period, that Listerine is the best antiseptic for daily employment in the care and preservation of the teeth. Listerine Tooth Powder, then, is not intended to supplant Listerine in the daily toilet of the teeth, but is offered in response to a popular demand for a frictionary dentifrice to be used in conjunction with this well-known and time-tried antiseptic.

Listerine Tooth Powder is composed of precipitated carbonate of calcium, carbonate of magnesium, oil of cananga, and the antiseptic constituents of Listerine.

The simplicity of its formula, in itself commends the powder. The English precipitated chalk and magnesia are the finest obtainable, and absolutely free from grit; the oil of cananga possesses properties opposed to inflammatory conditions of the gums, and together with the antiseptic constituents of Listerine, adds to the desirable qualities of the product. However, it is to the list of articles which have been omitted from the formula that special attention is directed, and the manufacturers believe the profession will agree that the absence of pumice stone, cuttlefish bone or other abrasive substances, and of sugar, orris root or superficial perfume of any character (the usual ingredients of tooth powders and liable in themselves to fermentative action in the mouth), is a distinct advantage.

Lambert Pharmacal Co.

St. Louis, U. S. A.

INDEX TO ADVERTISEMENTS.

Ash's Dental Rubbers

PINK RUBBERS FOR COATING.

	Shade	Per pound.	5 lb. lots.	10 lb. lots	25 lb. lots.
Gum Pink.	Light	$6.00	$5.40	$5.00	$4.50
Gum Pink.	Medium	6.00	5.40	5.00	4.50
New Pink.	Medium	6.00	5.40	5.00	4.50
No. 1 Pink.	Light	6.00	5.40	5.00	4.50
No. 1X Pink	Medium	6.00	5.40	5.00	4.50
N. V. (without Vermilion).	Light	6.00	5.40	5.00	4.50
English Pink.	Light	5.00	4.50	4.00	3.50
English Pink.	Medium	5.00	4.50	4.00	3.50
Weighted Pink (for lower dentures).	Medium	6.00	5.40	5.00	4.50

RUBBERS FOR BASE.

	Color.	Per pound	5 lb. lots.	10 lb. lots.	25 lb. lots.
Whalebone No. 1.	Dark Brown	$4.00	$3.60	$3.30	$3.00
Whalebone No. 2.	Light Brown	3.50	3.15	2.95	2.75
White.	Bone	4.00	3.60	3.30	3.00
Childs' G.	Bright Red	4.00	3.60	3.30	3.00
A. E.	Dark Brown	4.00	3.60	3.30	3.00
W.	Dark Brown	4.00	3.60	3.30	3.00
S. P.	Deep Pink	4.00	3.60	3.30	3.00
Solid Base.	Pink Brown	3.50	3.15	2.95	2.75
Dark Red.		3.00	2.70	2.50	2.30
Flexible Base	Light Brown	3.00	2.70	2.50	2.30
Dark Elastic.	Olive Horn	3.50	3.15	2.95	2.75
Maroon.		2.75	2.50	2.30	2.10
Red.		2.75	2.50	2.30	2.10
Dark Brown.		2.75	2.50	2.30	2.10
Brown		2.75	2.50	2.30	2.10
Orange.		2.75	2.50	2.30	2.10
Black.	Dark Horn	2.75	2.50	2.30	2.10
Improved Black	Jet Black	2.75	2.50	2.30	2.10
English Base.	Light Red	2.50	2.25	2.10	2.00
Weighted (for lower dentures).	Brown	4.00	3.60	3.30	3.00

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For tender gums, etc.

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Soft Dark Red (for lining palates).	"	"	3.50
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Repairing Rubber, color, pink.	"	"	6.00
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Directions for Vulcanizing accompany all rubbers.

CLAUDIUS ASH SONS CO.

(1905 Ltd.)

30 EAST FOURTEENTH ST., NEW YORK

Fellowship Burs

are those with the

"Dual" or Twin Blades!

These burs have now been before the profession for almost twelve years and throughout that entire time have rapidly grown in favor. They are made of the highest grade material, specially prepared to meet the requirements in a tooth-cutting engine instrument. With such a material as a basis the next important feature is the tempering. This is done according to a process peculiar to our factory only and the resulting product guarantees a bur which has that quality of hardness necessary to the retention of sharp and perfect cutting edges after repeated use.

The special feature of Fellowship Burs is that the blades are cut in such a manner as to afford twin or dual blades across the top. By this means our burs do not merely cut the dentin, but shave it, rather. This also means that they are self-cleansing, cut faster and with far less pain and discomfort to the patient,—all very important considerations.

Being almost entirely machine made, we are also able to guarantee uniformity in both form, size and cutting, thus making Fellowship Burs unequalled at the price.

Prices

Sizes 00 to	7,	inclusive,	per	dozen	$ 1.00
"	"	"	"	half gross	5.50
"	"	"	"	gross	10.50
"	8 to 11,	"	"	dozen	1.50
"	"	"	"	half gross	8.00
"	"	"	"	gross	15.00
"	12 to 14,	"	"	dozen	2.00
"	"	"	"	half gross	10.50
"	"	"	"	gross	21.00

Burs for Nos. 1 and 3 R. A. Attachments, sizes 00 to 7 inclusive, we retail at one-half prices quoted above.

Cash Discount: 3 per cent, up to $25; 5 per cent, $25 to $100; 10 per cent, $100 and over.

Dental Protective Supply Co.

1303-6 Heyworth Building, 34 Madison St.
Chicago

818 Real Estate Building, Philadelphia

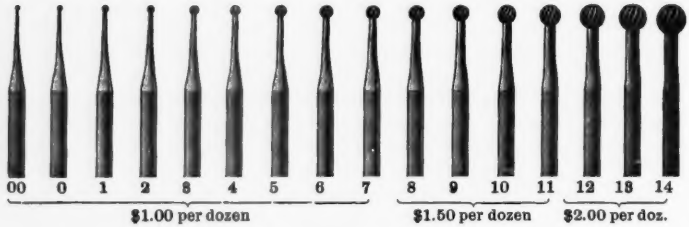
Please mention the DENTAL DIGEST when writing to advertisers

Fellowship Burs

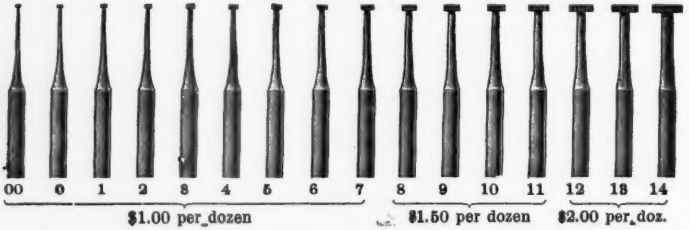
(DUAL BLADE)

The following illustrations show all the forms and sizes in which the Fellowship Cavity Cut Burs are made. They are supplied only for the Universal Straight Handpiece, and the various Angle Handpieces according to the styles of shanks shown on page 4 of this circular.

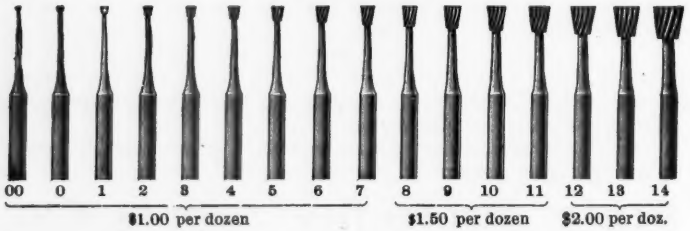
ROUND



WHEEL



INVERTED CONE

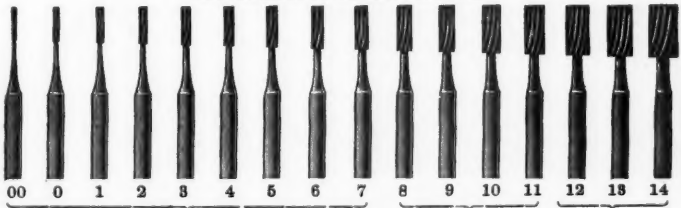


(When formulating your order be sure to specify for what style handpiece burs are required. See page 9.)

Fellowship Burs

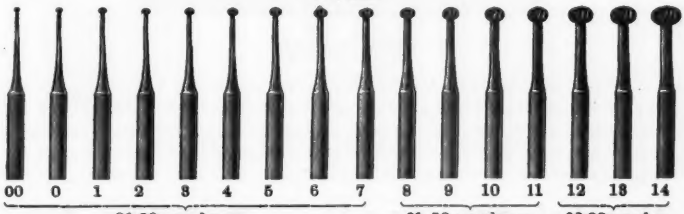
PEAR

SQUARE-END FISSURE



POINTED-END FISSURE

OVAL

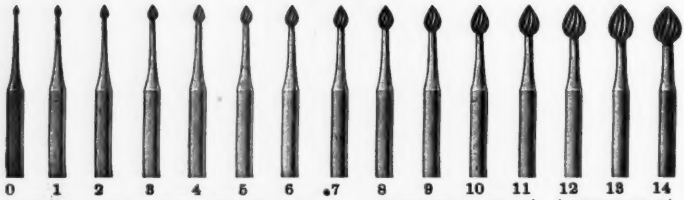


(When formulating your order be sure to specify for what stlye handpiece burs are required. See page 9.)

Fellowship Burs

CONE

BUD



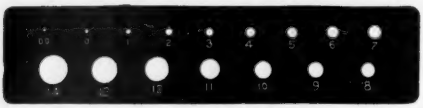
For Universal Straight Handpiece

For Nos. 1 and 3
Right Angle Attachments

For No. 2
Right Angle Attachment

For Davis Angular Handpiece

Fo Fellowship Angular Handpiece



BUR GAUGE

This imprint is shown for the reason that many will find in it an easier way of recognizing the exact sizes of burs required. All sizes shown on the gauge may be obtained in every pattern illustrated with the exceptions of the Pear, Cone and Bud. In these three latter no size smaller than No. 0 is made.

Dental Protective Supply Co.

Chicago **Philadelphia**

YOU NEED

an Electric Mouth Lamp for those dark cavities. We know scores of dentists who bless the day they invested in this outfit.

The D. P. S. Co.'s Electric Mouth Lamp

is simple in construction, neat and compact in design, and withal answers every purpose for which it is intended.

The plug, which admits of using the lamp on any electric-light fixture, also embodies the resistance. The lamp holder is of hard rubber and has midway of its length a small finger contact by which current is thrown on or off. The incandescent lamp, which can be readily replaced when burned out, is enclosed by a metal shield to which is attached an adjustable mirror. All metal parts are nickel-plated and the outfit is supplied with 5 feet silk conducting cord and for attachment to either Edison, Thompson-Houston or Westinghouse sockets. Can be furnished for 104-volt alternating, 110-volt direct currents or for 4 volts for use with batteries.

When ordering please give full particulars as to style socket, also voltage, etc.

PRICE, COMPLETE, $5.00

Price Complete (no socket needed) for use with batteries, $2.50

Dental Protective Supply Co.

CHICAGO **PHILADELPHIA**

1897 — 1907

A DECADE

of tests by use throughout the civilized world has only served to more firmly establish

Fellowship Alloy

in its position at the top of the list. Despite competition in its own field and many innovations in the way of filling materials and methods it is in ever increasing demand wherever dental material is sold.

It was formulated to provide the dentist with a really reliable and trustworthy metallic plastic filling. In this it has fulfilled the object of its genesis and is or should be the standby in every dental office.

Fellowship Alloy is always **Uniform**
Demand proclaims it **The Best**
In the long run **The Cheapest**

PRICES

1 ounce, - $3.00 5 ounces - $12.50

Subject to usual discounts for cash.

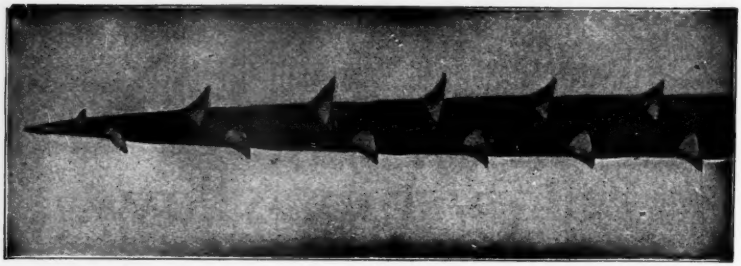
Manufactured solely by the

DENTAL PROTECTIVE SUPPLY CO.

CHICAGO — PHILADELPHIA

A Pointed Question

ARE YOU USING FELLOWSHIP BROACHES?



If not, you will find here appended a few reasons why you should:

First—Being made in our own factory they represent Fellowship quality and are therefore the best.

Second—They are made of a specially selected material in the hands of expert workmen.

Third—Well barbed in four distinct rows, every barb retaining its edge and strength indefinitely.

Fourth—Tempered by a special process, they are rendered tough and elastic but without being in the least brittle.

Fifth—Every broach is tested before leaving the factory.

Sixth—They were the first offered the profession at a reasonable figure.

We manufacture in four different sizes, and put them up in packages of six, containing either extra-fine, fine, medium, coarse or assorted.

Price, per dozen $1.00
" " half gross 5.50

Dental Protective Supply Company

1303-6 Heyworth Building, 34 Madison St., Chicago
818 Real Estate Bldg., Philadelphia

Impression Trays for Full Cases

These trays are made of heavy aluminum plate, and the handles extend well under the sides and are attached by means of three rivets, thus affording trays with almost as much rigidity as those of Britannia metal. It is conceded that aluminum trays are more cleanly and more adaptable, which facts, added to their extreme lightness, make them particularly desirable. Those trays illustrated above are for full cases, either upper or lower.

PRICE, EACH 25 CENTS

Dental Protective Supply Company

CHICAGO **PHILADELPHIA**

Impression Trays for Partial Cases

These trays differ only from those shown for full cases in that they are for partial dentures. Nos. 7 and 8 are designed for impressions for anterior bridges. Nos. 9 and 10 for either right or left, and upper or lower partial cases. No. 11 is intended for use where lower anterior teeth remain in the mouth. No. 12 is designed for wax bite plate.

PRICE, EACH 25 CENTS

Dental Protective Supply Company

CHICAGO **PHILADELPHIA**

MALLETING

by hand has lost much of its vogue in recent years. This fact may be largely attributed to the perfection now reached in the manufacture of mechanical mallets, notably those known as "automatic."

By the use of such an appliance a marked saving of time is effected without lowering in any sense the standard of the work done.

IN THE

Fellowship Automatic Mallet

we draw attention to an appliance which we consider second to none. The construction is simplicity itself, the direct and pull strokes being governed by the same mechanism. All the working parts are carried by the spindle, which reduces the friction. All those parts subject to wear are made of hardened steel. The workmanship throughout is the very best. The mallet gives a uniformly dead blow, the force of which may be varied to suit the needs or wishes of the operator. The adjustment to regulate this is made by turning a knurled thimble at one end.

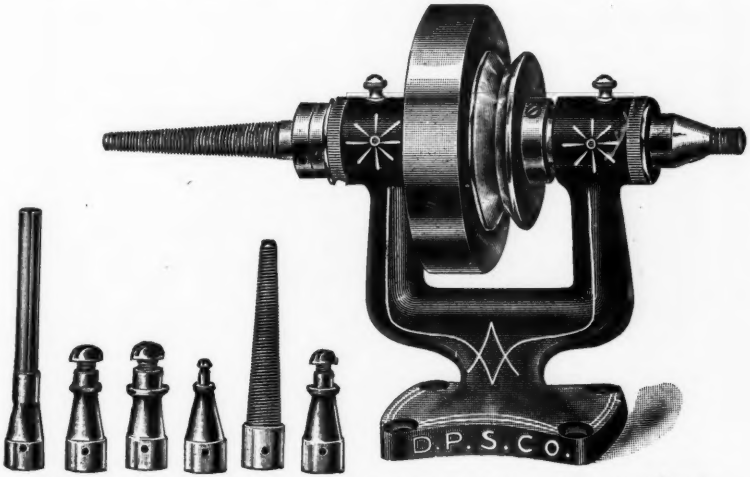
Both ends are drilled to hold either the cone socket or automatic plugger points. The "grip" on either end is covered with black hard rubber.

PRICE, $6.00

Dental Protective Supply Co.

CHICAGO PHILADELPHIA

THE FELLOWSHIP LATHE HEAD AND CHUCKS



This lathe is made on the cone journal principle. ***IT HAS DUST-PROOF CONE BEARINGS and the CHUCKS ARE SELF-TRUING***

The spindle bearing on right side is fixed, while that on the left is movable, so that any wear may be taken up readily. There is a jamb nut to tighten the movable cone when adjustment has been made and to prevent its working loose.

The dust-proof caps prevent grit from working into the bearings and destroying them.

All chucks are self-truing. The hole in each is conical, so that when screwed onto the spindle shaft the chuck seats itself over a corresponding taper, and is thus held in perfect alignment with spindle.

All polished parts are nickel-plated, while the balance is japanned.

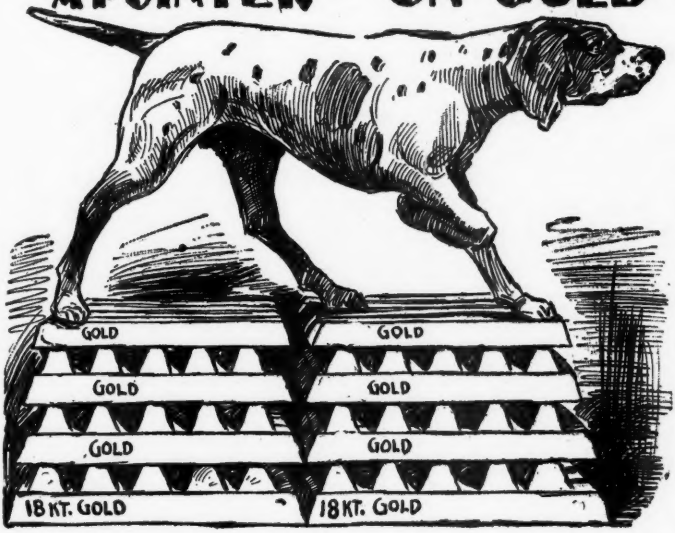
Price, complete, with six chucks, $7.00

Manufactured by

DENTAL PROTECTIVE SUPPLY COMPANY

1303-6 Heyworth Bldg., 34 Madison St., Chicago
818 Real Estate Bldg., Philadelphia.

A POINTER - ON GOLD.



GOLD PLATE This should be absolutely free from flaws, uniform in gauge and fineness, soft and pliable, of good color, and last, but not least, the price must be right. Our plate comes fully up to all requirements.

GOLD SOLDER To insure perfect results in plate and bridge work it is essential that the solder be of the same color as the plate. You take no chances when you use our plate and solder. Our solder does not "ball," and being chemically pure does not oxidize in the mouth. Write for samples.

FILLING GOLD Our foil and cylinders are chemically pure and do not contain carbon and impurities that are at times found in others. They are easily manipulated and our many satisfied patrons say it's hard to break the "Goldsmith habit" when once acquired. Goldsmith foil and cylinders are the lowest in price of any, and the cheapest at any price. Write for samples.

☞SEE OUR PRICE LIST ON PAGE 45.

GOLDSMITH BROS.,

Refiners and Manufacturers of Dental Specialties,

63 Washington St., CHICAGO, ILL.

NEW YORK OFFICE: 230 Grand Street.

Note Our Prices

and bear in mind that we absolutely guarantee our gold to be of the FINENESS specified and FULL WEIGHT. We mean to continue to uphold the good reputation this firm has enjoyed the past 35 years.

Price List.

Gold Foil, ½-oz.	$ 2 25
Gold Foil, per oz.	25 00
Gold Cylinders, ½-oz.	3 50
Gold Cylinders, per oz.	26 50
14K Solder, per dwt.	65
16K Solder, per dwt.	75
18K Solder, per dwt.	85
20K Solder, per dwt.	95
Coin Solder, per dwt.	1 00
22K Solder, per dwt.	1 00
18K Gold Plate, per dwt.	85
20K Gold Plate, per dwt.	95
22K Gold Plate, per dwt.	1 05
24K Gold Plate, per dwt.	1 10
Coin Plate, per dwt.	1 02
Clasp Metal, per dwt.	85
Clasp Wire, per dwt.	1 00
Platinized Gold, per dwt.	1 15
18K Gold Wire, per dwt.	95
20K Gold Wire, per dwt.	1 05
24K Gold Wire, per dwt.	1 25
Platinum Sheet or Wire, per dwt.	Market Price.
Platinum Iridio Wire, per dwt.	Market Price.
Pure Silver, per oz.	$ 0 75
Columbian Alloy, $2.00 per oz; 3 ozs. for	5 00
65 Silver, 35 Tin Formula, $1.00 per oz.; 10 ozs. for	7 50
Aluminum, per oz.	10
German Silver Plate, per oz.	10
Pure Zinc, per oz.	10
Pure Tin, per oz.	07
Pure Copper, per oz.	05
Pure Bismuth, per oz.	20
Broaches, per doz.	1 00
Burs, per doz.	1 00
Carborundum Strips, per box	35
Carborundum Disks, per box	08

5% Discount on 22K Gold Plate and Solder in ounce lots.

☞Send us your orders—We'll do the rest

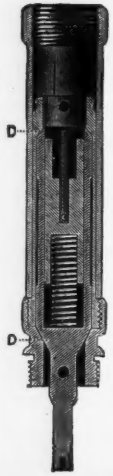
Goldsmith Bros.,

Refiners and Assayers,

63-65 Washington St., Chicago.

New York Office: 230 Grand St.

THE FELLOWSHIP
Slip-Joint Connection



The sectional illustration shows the perfect mechanism of this attachment and will prove our claim to having the simplest appliance of its kind.

Unlike the majority of Slip-Joint Connections, the wear in the Fellowship can be taken up by means of the cone bearings at D-D, a feature which absolutely guarantees that this appliance will outwear any other. The double bearings also insure perfect and true running, thus obviating any possibility of the bur wobbling.

All parts are so threaded as to admit of its application to any handpiece, thus making it distinctly universal.

A glance at slip sheath A will show how simple the locking device is and will also furnish another proof of the simplicity of design and mechanism, as there is no awkward spring or lever to obstruct its ready use. In other words it is, as such an appliance should be, a true slip-joint connection.

PRICES: Complete, Parts A, B, C, $5.00; Extra Sheath, A, 75 cents; Extra Dog, C, 25 cents.

Dental Protective Supply Company

1303-6 Heyworth Building, 34 Madison St. CHICAGO

Branch: 818 Real Estate Building, Philadelphia

Teeth Reflections

are a most necessary accompaniment of the dentist's profession! Hence the need of a good mirror.

Our dental mirrors are unexcelled. The glasses for the lenses are carefully selected and the latter are mounted in heavy german-silver frames, being made as near aseptic as possible. The handles are reinforced where they screw into the sockets by means of threaded metal rods, thus entirely obviating any risk of breakage. Supplied with either plain or magnifying glasses and black or white handles.

Sizes as follows:

No. 1, $\frac{5}{16}$ in.	No. 2, $\frac{11}{16}$ in.	No. 3, $\frac{3}{4}$ in.
No. 4, $\frac{7}{8}$ in.	No. 5, 1 in.	No. 6, $1\frac{1}{16}$ in.

PRICES:

With handle, each - - -	$ .65
Without handle - - - -	.50

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Cast Gold Inlay

No one any longer doubts the virtue of the cast inlay. It constitutes a new era in dentistry. The results are as perfect as the most perfect mechanics can make them. But to have perfection in mechanics you must have perfection of mechanism, and this you secure only in the ***TAGGART MACHINE.*** When you have tried the numerous spurious and imperfect imitations come back to the real fountain-head of the process, and get a Taggart. Then you will know what perfection means.

A very superior carving-wax which can be held in the fingers and carved with no danger of marring the finest margins will be sent with each outfit, also an investment material which has no rival for this special work.

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Price $100.00 Complete, Less 10% for Cash

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METALITE Pins

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$1.00 Per Set of 14 Plain Teeth

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For more than twenty years sold under the trade-mark, "BOW SPRING."

Goodyear Crown Flexor. (Original "Bow Spring.)	¼ pound box at	$0.50	per box
	½ " "	0.90	"
	1 " "	1.75	"
	5 " "	1.60	per pound
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	1 " "	2.60	"
	5 " "	2.50	per pound
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	1 " "	1.75	"
	5 " "	1.60	per pound
Goodyear Crown Ethiopian. (Jet Black.)	¼ pound box at	$0.50	per box
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	1 " "	1.75	"
	5 " "	1.60	per pound
Goodyear Crown Light Red. (Original No. 1 Improved.)	¼ pound box at	$0.55	per box
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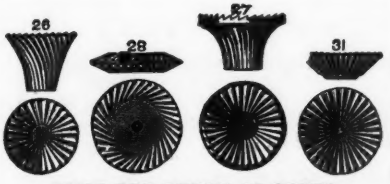
	1 " "	1.90	"
	5 " "	1.75	per pound
Goodyear Crown Maroon.	¼ pound box at	$0.50	per box
	½ " "	0.90	"
	1 " "	1.75	"
	5 " "	1.60	per pound

Goodyear Crown Dam	Box containing	5	yds.	6	in.	wide,	thin	$1.00
	" "	5	"	6	"	"	medium	1.30
	" "	5	"	7	"	"	thin	1.15
	" "	5	"	7	"	"	medium	1.50

Goodyear Crown Corrugated Soft Rubber Points.



PRICE PER DOZEN, 30 CENTS

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Goods will be delivered post or express paid.

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It is prepared in a manner similar to cement and is moulded to the form of any cavity without difficulty. After being moulded and allowed to set it is baked, and when the necessary finishing touches have been given it is ready for setting to place.

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Put up in single color boxes—Light Yellow, Medium Yellow, Dark Yellow, Gray, Pearl Gray, Greenish Gray, Blue, Light Brown, Dark Brown and White.

Price, Per Box, $2.00

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Chicago Philadelphia

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Fellowship Modelling Compound

IS ONE OF SUCH

It softens readily in hot water and takes a sharp, accurate impression, defining every ruga and line of the denture. Used according to directions it will neither crawl nor become sticky. It hardens quickly and with comparatively no shrinkage. Supplied in three grades, medium, hard and a special for inlays; put up in half-pound boxes.

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An Open Letter to Dentists

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HERMAN C. G. LUYTIES

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DEAR DOCTOR:—Have you carefully considered the meritorious proposal that the co-operative, profit-sharing Sanitol Chemical Laboratory Company are making you for subscribing to its voted increase in stock, and participating in the profits of the business?

The plan of co-operation on which the company is organized is well known to you, and you also realize the merit and unique value of the Sanitol preparations themselves.

For ten years the company has been known as thoroughly reliable, and conservative in its business. The Sanitol trade, which has been firmly established, is profitable and to-day presents the most remarkable possibilities for future growth.

Did you ever stop to consider that if the Sanitol preparations were used by every family in the United States, it would mean millions of dollars each year in profits to be shared by the stockholders? Our object is to conduct a vast educational campaign for tooth health that will ultimately place Sanitol in every home.

Sanitol has been introduced into forty-two foreign countries. This is the last time that the dentists of the United States will be allowed to accept the privileges of Sanitol co-operation by joining the Sanitol Company.

Bear in mind, Doctor, that St. Louis stockholders have said: "It is our opinion that the investment made by dentists will steadily grow in value, hence urge co-operation to the end that the development of the business may be successfully carried out."

The new stock is being rapidly subscribed. There is a limited amount reserved for dentists. We wish to have this stock distributed among Sanitol's friends, those who believe in and will recommend the superior Sanitol tooth preparations, and who will support the company's interests.

We believe that dentists and druggists who push Sanitol have a right to share in the profits of the company. Four hundred and sixty-five thousand dollars has already been distributed among stockholders. Why not invest in an assured success?

Write me to-day, and receive information as to the liberal terms by which you can obtain some of this stock.

Yours very truly,

HERMAN C. G. LUYTIES,

President, The Sanitol Chemical Laboratory Company, St. Louis.

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Dentists who invested $100, ten years ago, have received $116 cash in dividends, and still hold their dividend-paying stock.

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Dentists are peculiarly fitted to become interested in the Sanitol business, because the products manufactured by them are sold through the recommendations of the dental profession.

An investment in Sanitol is not an experiment. It is a proven success.

Far from being a speculation, an investment in Sanitol is a gilt-edged investment. Almost a security. There is no industrial company in the world that has grown so rapidly during the past few years as has Sanitol.

The new voted issue is being distributed to those dentists who wish to become associated with the company, who were not able to do so before, and to five thousand of the leading druggists of the country. Subscriptions are now being received Think it over, doctor, and decide early to make a good investment.

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THE NEW HOME OF SANITOL

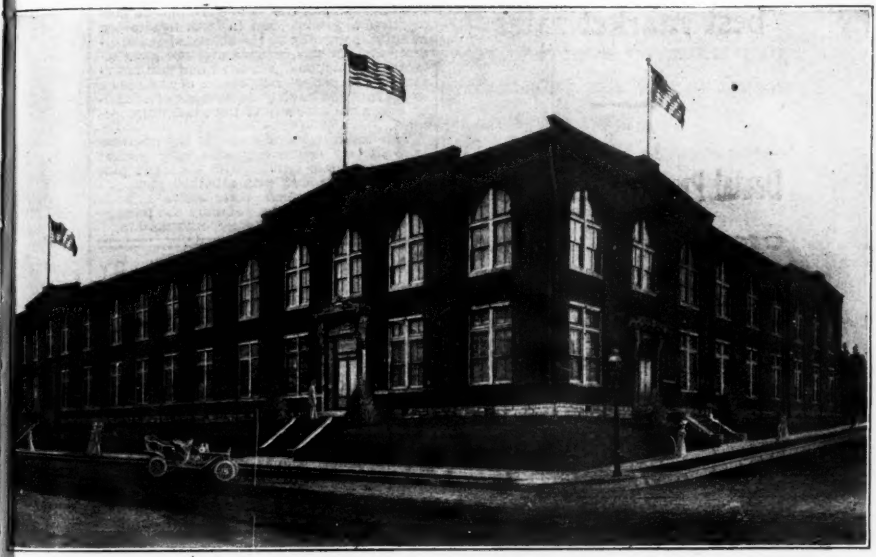
Has just been erected at a cost of $155,000.

New machinery and modern appliances have been added to bring the cost up to $200,000.

There are over two and one-half acres of floor space.

Its capacity is 1,000 gross per day.

This plant is the largest and best equipped laboratory of its kind in the world.



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50 shares, $500—$100 with application, $100 each month for four months.
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